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ABSTRACT

The trade unions in the European aerospace and electronics industries have become concerned with the sweeping and rapid economic and technical changes taking place in the industries. This seminar enabled trade union representatives from Belgium, France, the Netherlands, and the United Kingdom aerospace industry and the electronics sector working for the aircraft industry to discuss their problems and acquire an understanding of each other's attitudes and policies. The participants focused their argument upon the broad economic policies affecting the destiny of their respective national industries. The British delegation reported particularly upon the nature of the issues in their country and the alternatives they were considering to maintain employment for the present work force and the other three delegations supplied information on the issues in their countries. The outstanding conclusion to be drawn from these discussions is the high priority assigned by trade-unionists to broad economic and political policy when jobs are in danger and their expectations are being frustrated. Background papers, speeches, and supplementary papers are included. (HC)

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INTERNATIONAL SEMINARS 1966-3

GEOGRAPHICAL AND OCCUPATIONAL MOBILITY OF WORKERS IN THE AIRCRAFT AND ELECTRONICS INDUSTRIES

REGIONAL TRADE UNION SEMINAR

Paris, 21st-22nd September, 1966

FINAL REPORT

U.S. DEPARTMENT OF HEALTH, EDUCATION & WELFARE
OFFICE OF EDUCATION

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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1967

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FOREWORD

The present seminar deals with the way in which the general principles of an active manpower policy should be applied to the aircraft industry and aircraft division of the electronics industry which experience a high rate of economic and technical change. It is the sixteenth in the series of the Employer-Union Programme. It is the third regional seminar but the first exclusively for trade-unionists.

This seminar is a follow up on the International Joint Seminar held in November 1963 in Castelfusano on "Geographical and Occupational Mobility of Manpower" (1963-3). Using the conclusions of that seminar as a point of departure, the trade-unionists were asked just how the general programme should be supplemented or modified to meet the special needs of employees in their industries.

The programme was organised so that the Seminar devoted separate days to the two industries to prepare for the final summary discussion of comparison and methods of application of special manpower programmes for them. Actually the participants, at the initiative of the British delegation, focused their argument upon the broad economic policies affecting the destiny of their respective national aircraft industries. The concern for the future was so overriding as to claim this primary attention. The British delegation reported particularly upon the nature of the issues in their country and the alternatives they were considering to maintain employment for the present work force. The other three delegations supplied information on the discussion in their countries.

The outstanding conclusion to be drawn from these discussions is the high priority assigned by trade-unionists to broad economic and political policy when jobs are in danger and their expectations are being frustrated. The feeling of anxiety was highest among the British but it was shared by the French, the Belgians and to a lesser extent by the Dutch. They were ready to urge overall programmes which would assure the continued existence of their national industries. The discussion therefore centred on the alternative methods of achieving this aim and the experience with various techniques, particularly the diversification of production.

The degree of special treatment to be given employees in such highly volatile industries depended in part, it was concluded, upon their separate settings. Innovation in the electronics sector was taken for granted and adaptations to these changes were built into the existing organisational structures. On the other hand, the far-reaching nature of the changes in the aircraft industry, in a setting where the industries in Great Britain, Belgium and to a lesser extent France were contracting, caused considerable concern and prompted special interest in programmes to assist these employees. The varying degrees of instability and concern about the future also affected the level at which the participants sought their primary protection for employees. Those who were most troubled by the outlook regarded national programmes as most important, whereas those who thought that the overall level of employment would remain relatively stable but that there would be changing job requirements as well as shifts in the location of the industry, considered the enterprise programmes as the most vital.

The present volume consists of a summary report prepared by André Granouillac, Director of the Economic and Social Studies Department of CGT-FO (France). It reflects the actual discussion which took place at the seminar and the papers which were considered. It is followed by a statement of issues and conclusions presented by Solomon Barkin. There follow the two introductory papers, one on the aircraft industry by D. Vesey-Holt and the other on the aircraft sector of the electronics industry by C.A. Freeman. Lists of the participants and of the publications of prior International Seminars and Conferences are also included.

The supplement to this volume is published separately but its table of contents is reproduced at the end of this volume. It includes the papers presented by the rapporteurs who described the manpower adjustment programmes in the two industries in each of the four countries. The general report presented by R. Cottave is a summary of this discussion. The supplementary papers reflecting developments in the United States made available to the participants are also reproduced.

Solomon Barkin,

Deputy to the Director for Manpower
and Social Affairs and Head of the
Social Affairs Division, OECD, Paris.

SUMMARY REVIEW OF PAPERS AND DISCUSSION

by
André Granouillac
Head of the Economic and Social Studies Department
Confédération Générale du Travail
(Force ouvrière)

8/9

Usefulness of the confrontation

The Trade Union Advisory Committee to the OECD is particularly grateful that such a seminar should have been organised. It provided the trade-unionists with an opportunity for jointly studying some of the more pressing manpower problems in both these industries. None of these seminars are held for policy-making purposes, but a thorough-going discussion of the reports enables the participants to gain a clearer idea, in an international context, of problems and of how other countries attempt to meet them.

Attendance at such a seminar can also bring out the differences in methods of approaching and dealing with problems, as determined by each country's national features and each firm's individual peculiarities. To be sure, regardless of the country or enterprise, the electronics and aircraft industries follow a general trend, one which has most accurately been described by Mr. O. Vesey Holt, from the Northampton College of Advanced Technology (United Kingdom) in an introductory report; yet this general trend only constitutes a common background against which must be set very different types of development for each country and concern.

The general context

The aircraft and electronics industries are two of the sectors expanding most rapidly today, and are twin industries at the forefront of the technological revolution. The attainment of supersonic speeds has resulted in craft of high technical refinement, built at mounting cost: military and civilian requirements have thus led to substantial advances in helicopter and vertical take-off design, while the achievement of supersonic speeds in aircraft and rockets has resulted in the development of new materials for which there was no requirement before.

But such work undertaken at the frontiers of human knowledge has not been achieved for nothing. The cost of aircraft has vastly increased. A fighter plane in wartime cost $30,000 to produce, whereas the last generation of manned fighters cost $1,500,000 each. The TSR2, which had to be cancelled by the British, would have cost $150 million to develop and $3,000,000 for each production plane. A new subsonic airliner and a new engine could require $150 million to develop and some $9,000,000 apiece. As for supersonic aircraft, the latest estimate (early in 1967) for the Anglo-French Concorde is $1,400 million including at least $250 million for testing and development.

The rise in costs has resulted in the cancellation of projects, with varying consequences. Confronted with the need to acquire planes equipped with the latest refinements, the airlines have been compelled to scrap and replace craft still in excellent condition.

Both in Europe and the United States, aircraft production is a capital-intensive industry, even though the amount of capital invested per worker is probably three times higher in America than in Europe. The proportion of research and development expenditure to total costs is much higher than in other manufacturing industries, and may attain as much as 38 per cent. This means that the length of the production run is vital to profitability. Whenever the production run can be doubled, the cost price can be reduced by 10 per cent. The savings derived from long runs have thus enabled American manufacturers to obtain costs from 10 to 20 per cent lower than their European competitors: the builder who can reasonably hope to sell 200 aircraft can count on a price $380,000 less than one whose market would only be 100, and $600,000 less than a manufacturer selling only 50.

These figures show the significance of "development costs", which American manufacturers are able to absorb, because their production is on a sufficiently large scale thanks to indirect help from the government in the form of orders for military aircraft. A natural consequence has been intervention by European governments in the aircraft industries of their countries, in which the problems differ according to the national conditions.

National situations

A few figures mentioned at the seminar will indicate the scope of the questions discussed:

Aircraft industries throughout the world

Country	Numbers employed (all categories)
1. United States	625,000
2. U.S.S.R.	590,000
3. Great Britain	265,000
4. France	90,000
5. Germany	35,000
6. India	25,000
7. Canada	18,000
8. Italy	13,000
9. Sweden	11,000
10. Spain	8,000
11. Belgium	6,200
12. Netherlands	6,100

Source: "Il Giorno", 9th July 1965, based on an article appearing in "The Economist", a British weekly publication.

It will be noted - in regard to the countries represented at the seminar - that while the disparity is already considerable between Great Britain and France, it is greater still when Great Britain and France taken together are compared with the widely different cases of Belgium and the Netherlands.

British anxiety

In Great Britain 265,000 workers are employed in the aircraft industry. Mr. Dan Lewis, a member of the Amalgamated Engineering

Union's Executive Committee, Chairman of the seminar, and Mr. H. Scanlon, a reporting member of the same union, stress several points:

- A decline in the work force since 1957.
  Employment reached a peak of some 310,000 in 1957, but has since steadily declined. The official committee instructed to study the future prospects of the aircraft industry (the Plowden Committee) reported at the end of 1965 that, while they declined to predict the future dimensions of the industry, they foresaw a further substantial drop to some 200,000 workers by 1970.

- Productivity efforts. The prospective decline might be even greater, since productivity in the United Kingdom compares unfavourably with that of France or the United States. Productivity is thus considered to be some three times higher in the United States and one and a half times higher in France.

- Concentration and rationalisation. Contraction of the British aircraft industry has already seriously reduced the number of firms. Mergers have been encouraged by the Government, which has used its power as a purchaser of both military and civil machines (for use by the nationalised airlines) to retain only two manufacturers of airframes (Hawker Siddeley and British Aircraft Corporation) and two engine manufacturers (Bristol Siddeley Engines and Rolls Royce), a helicopter firm (Westland Aircraft), plus a number of smaller firms. The big merger announced (between Bristol Siddeley Engines and Rolls Royce) would leave only one engine firm in the country. Many jobs are likely to disappear as a result of these operations.

If the aspects peculiar to the British aircraft industry are set against the background of Britain's general economy, it is easy to see why the British trade unions speak of their branch as an industry in difficulties, and largely support the conclusions of the Plowden Committee, which state in part that: "The difficulties, though arduous ... in a somewhat less acute form face all technologically advanced industries in this country. Indeed, the aircraft industry may be conceived as today embodying the predicament, as it has long embodied the aspirations, of the United Kingdom in the world. If the aircraft industry's problems are not solved, they will simply have to be tackled again elsewhere, while in the meantime the nation will have lost much."

French equanimity

The introductory section of Mr. F. Boutaud's report, submitted on behalf of the Metal Workers Federation (Force Ouvrière), faithfully reflects the French trade-union attitude:

> "Over the last few years the French aircraft industry has been steadily expanding, with a corresponding growth in the number of workers it employs, as shown in the following table:

	Total labour force at the end of the year			
	1961	1962	1963	1964
Airframes	49,000	49,750	51,680	53,785
Engines	16,650	17,750	18,825	18,835
Accessories	20,200	20,800	20,750	31,425
Total	85,850	88,300	91,255	104,045

> In addition to the above, there are 337,000 workers in avionics, who account for under 3 per cent of the total labour force in the electrical industries.
>
> The relative size of the aircraft industry may be assessed from the figure quoted for manpower employed on aircraft construction, which is some 100,000 out of roughly 7,000,000 wage-earners employed throughout French industry as at 1st January 1964.
>
> These data will indicate the comparative smallness of the French aircraft industry from the standpoint of numbers

employed, and point to the relative stability of its labour force."

This general information obviously covers a lot of rather varying situations. The process of development has not always been smooth and there may well be difficulties in the future, but at the time of the seminar (September 1966), the only subject for concern was that of the problem (since solved) connected with the Anglo-French supersonic Concorde.

Belgian misgivings

Mr. R. Decoster, National Secretary of the Metal Worker's Union (F.G.T.B.) describes the situation in the Belgian aircraft industry as follows:

> "Two large aircraft firms have existed in Belgium since 1920: the SABCA (Société anonyme belge de constructions aéronautiques) and the S.A. Avions Fairey.
> In the immediate postwar years from 1946 to 1950, activities were confined to repair and maintenance work on military aircraft.
> In 1950, Avions Fairey and the Fabrique nationale d'armes de guerre at Herstal received an order for 67 Meteor jet aircraft.
> In 1953, the Belgian aircraft industry received an order for 460 Hawker Hunter fighter planes, to be carried out in conjunction with Fokker and Aviolanda in the Netherlands.
> The Fabrique nationale works produced Avon-type jet engines for aircraft supplied to Belgium and the Netherlands.
> Overhaul and repair contracts are an important source of business for the industry, and a further impulse came with an order for a hundred F104 G's (which added 2,000 new workers to the above-mentioned concerns)."

These indications provide some idea of the scope of the problems facing both Belgian trade-unionists and employers in the industry:

- Stability in the Belgian aircraft industry is unsatisfactory: owing to its over-reliance on foreign orders - especially of a military kind - it is forced to lay off or discharge part of its manpower at regular intervals.

- Since Belgium is a small country, there can be no question of a fully-fledged aircraft industry; neither the money nor the design staff are available for it to contemplate the overall production of new types of aircraft.
- For political and economic reasons, it is moreover unable to undertake the complete assembly of military or even civil aircraft - with the exception of training and light aircraft.
- The division of labour at international level is such that Belgium cannot go beyond the assembly or manufacture under licence of certain parts and assemblies.

No better illustration can be given of Belgian misgivings than the order for a hundred F104 G's, which caused the following employment changes in the main plants:

- before the order : 2,903 workers and employees;
- during the order : 4,330 workers and employees;
- after the order : 2,895 workers and employees.

Hence the additional staff (some 1,400 people) recruited to fill the order for 100 aircraft were dismissed after its completion. It stands to reason that a change affecting a third of the numbers employed (even though but 1,400 people) raises serious problems.

Dutch confidence

Fokker and Aviolanda together employ some 6,000 people, and account for nearly all the Dutch aircraft industry. The leading firm is Fokker, whose remarkable success with the Fokker Friendship is by now widely known. This machine, besides being manufactured by other firms in Europe, has the rare distinction of being produced under licence by the Fairchild Company in the United States.

A review of the Fokker and Aviolanda production schedules will show that the Netherlands aircraft industry also manufactures products not directly related to aircraft construction; it will also be clear that many of these products require manufacture through use of similar skills. An advantage of this diversification is that it helps to stabilise employment. Any extension of these activities would however come up against the Netherlands' existing labour shortage, while in the event of a heavy demand for the accessory products, specialised departments will of course normally be set up. These departments then lead a more or less separate existence with their own varying levels of employment. In some instances this may even be the occasion for taking the entire productive process away from the aircraft industry and incorporating it into some new, separate undertaking. This, for example, could well be the fate of panels for housing produced by the plastics division of Fokker. If production of these panels on a commercial basis is found possible, Fokker is considering the establishment of a separate undertaking for the purpose.

The development of prototypes and mass production, the building of military aircraft under licence, participation in the development and construction of aircraft of foreign design, repair and overhaul of planes, space-research prospects, the production of plastic goods, the growth of its after-sales service, government assistance for the development costs of national projects, etc., all help to explain Dutch confidence in the country's aircraft industry.

The problems of other European countries were not overlooked by the members of the seminar, even though no delegates from these countries shared in the discussions.

The German aircraft industry only employs about 35,000 workers. It has, however, increased its capacity by manufacturing American equipment under licence. A substantial interest is held by the United States, and France owns 25 per cent of the shares in a leading firm. Germany is a leading participant in the inter-European consortium producing Starfighters.

Other European countries, while possessing an aircraft industry, are largely concerned with the manufacture of equipment under licence and participation in international projects. Apart from the Netherlands (discussed above) none produce complete machines. In Sweden, the SAAB manufactures aircraft for the country's armed forces, making it the only nation of its size self-sufficient in aircraft.

National factors affect trade-union response. The discussants from the various countries, in describing their experiences, clearly showed up the differences between countries. British anxiety, French equanimity, Belgian misgivings, and the confident approach of the Dutch all explain the varying types of action taken on behalf of workers in the aircraft industry.

National reports on the electronics sector working in conjunction with the aircraft industry were submitted by:

T.A. Breakell, Executive Councillor, T.U.C.,
Electrical Trades Union,
Great Britain

R. Javaux, Secretary General
Centrale chrétienne des métallurgistes, C.S.C.B.,
Belgium

H.J.M. Van Velthoven, Economic Adviser,
Metal Workers Union N.K.V.,
Netherlands

All three, just as Mr. C. A. Freeman in his introductory report, show the valuable contribution made by electronic processes to the development of both civil and military aviation, neither of which could exist in its present form or have attained its present efficiency without electronics. At the same time, the electronics industry has derived substantial benefit from the mass of research and development undertaken in the field of avionics, partly sponsored by government and assisted by the various government establishments engaging in such activities.

During the Second World War, exacting and urgent national demands were placed upon both industries, and under their stimulus scientific discoveries and technical innovations proceeded apace, so that by the end of the war a great variety of technologies had been given practical effect. With the return to peace-time conditions, and some relaxation of security regulations, it became possible to apply much of this development to civil purposes.

While the aircraft industry extended its growth into supersonic and aerospace projects, the electronics industry further developed its techniques and equipment and found a wide range of activities in all spheres of industry and services. Meanwhile both industries maintained their close co-operation in the avionics field, which accounts for the largest single group of electronic products in both the United Kingdom and the United States.

Due to the diversity of electronic products and their applications, it is difficult to determine the total proportion of manpower engaged in the research, design, development and installation of aircraft electronic equipment. This is also true of statistics on production, exports, imports and investment, which are generally considered to be both unreliable and inconsistent, and serve only as a general guide to trends rather than as absolute values.

In view of these uncertainties - and the general information provided by the four above-mentioned reports (by Freeman, Javaux, Breakell and Van Velthoven) - the members of the seminar deemed it best to refrain from venturing too far into this area, and to focus their attention on trade-union concerns in the aircraft sector.

Trade-union concerns

Regardless of a nation's particular situation, the aircraft industry and associated electronics industries are subject to rapid fluctuations in government orders and to technical innovations that may result in the unemployment of thousands of workers. While the reports presented at the seminar indicate that this has not so far occurred, and that any excess manpower has been reabsorbed because adjustments took place in a period of full employment, a question broached was what would have happened if such adjustments had been made during an economic recession. For a good many years the trade-union movement has insistently been pressing, both at national and international level, for a better forecasting and planning of manpower needs,and for educational and training programmes in response to such forecasts and plans. A number of studies have now been undertaken by the OECD and other organisations on the techniques and feasibility of forecasting, while the reluctance noted from the national viewpoint to foresee manpower needs has partly been overcome and services with the sole object of conducting forecasts have been set up in several countries.

In the face of these difficulties, the trade-unions have reacted in various ways.

The British want a system guaranteeing general protection

Mr. Scanlon in his report stresses the trade-union attitude as related to political factors.

> "The trade-unions, the T.U.C. and to a somewhat lesser extent the workers themselves reconciled their conflicting interests and accepted with more or less good grace the inevitable. Whether or not they would have accepted a similar decision by

> a Conservative Government so readily, may now be of only academic interest and any speculation must involve a good deal of subjectivity, but it would seem that one of the most influential factors determining trade-union thinking on the issue was undoubtedly the need not to maliciously embarrass a government sympathetic to their interests and newly elected after 13 years in the wilderness ...
>
> Having rejected direct action as a means of fighting redundancy the shop stewards took the only logical corollary to their decision - they set themselves the task of gaining the best possible deal for their fellow-workers who were being forced to leave the industry ...
>
> Perhaps the major feature of the redundancies in the aircraft industry has been the implementation of the provision of the Redundancy Payments Act. In fact it would not be too extreme to say that without the tax-free payments payable under the new redundancy scheme the whole operation would never have been carried out with the good-will that eventually prevailed on both sides of the industry."

Just what does the Redundancy Payments Act say?

"The Act requires employers to make lump-sum compensation payments, called 'redundancy payments', to employees who are dismissed because of redundancy. It also requires these payments to be made in certain circumstances to employees who have been laid off or kept on short time for a substantial period. The amount of the payments is to be related to pay, length of service with the employer, and to age.

"The Act also establishes a Redundancy Fund, financed by contributions collected with the employer's flat-rate National Insurance contribution. Employers who have to make redundancy payments as required by the Act may claim a rebate of part of the cost (ranging from two thirds to just over three quarters) from the Fund.

"The Act provides for disputes about entitlement to redundancy payments or about claims for rebate from the Fund to be settled by Industrial Tribunals established under the Industrial Training Act of 1964.

"The scale of payments is based on years of service as follows:

1. For each year of employment between ages 18 and 21 inclusive - half a week's pay;
2. For each year of employment between ages 22 and 40 inclusive - one week's pay;
3. For each year of employment between ages 41 and 64 (59 for women) inclusive - one and a half week's pay.

The selection of workers to be dismissed, the control of overtime working, the suppression of sub-contract work, and transfers to new jobs were decided upon in conjunction with the union. Just over 8,000 workers were made redundant in 1965, and by February 1966 only 248 were still registered with the Ministry of Labour as unemployed. The rest were re-employed in the aircraft industry (19 per cent), metal-using industries other than aircraft (52 per cent) and other industries (29 per cent).

Additional agreements (with Rolls-Royce), as well as provisions covering unemployment, sickness and resettlement benefits complete the scheme and are also described in full by Mr. Scanlon.

The French negotiate at firm level

A set of general measures is designed to:

- Promote retraining;
- Promote relocation;
- Compensate earnings in case of downgrading;
- Promote retirement;
- Promote job creation.

After introducing and analysing these factors in his report, Mr. F. Boutaud questions their effectiveness in regard to the aircraft industry. He concludes as follows:

> "The overall measures instituted to counter fluctuations in employment would be ineffective if the aircraft industry were to enter a period of severe crisis. The high degree of specialisation in the industry, together with its geographical location, are important factors which would make it particularly difficult to find adequate solutions.

The position in the avionics sector is not quite so sensitive. These special activities are carried out by firms engaging in widely diversified production, and the personnel involved appears capable of adjustment to new production lines without undue trouble. The aircraft industry is a prize customer of the electronics industry, with which it places substantial orders, but loss of its custom may well be replaced by other lines of production.

The position is not the same where the aircraft industry proper is concerned, and the attempts by some factories to introduce alternative lines have not fulfilled expectations. Other solutions must hence be found so that the effects of economic and technological trends can at least be mitigated if not entirely avoided."

Such solutions were discussed by Mr. G. Laroussinie, who spoke on behalf of the Metal Workers Federation, C.F.D.T. (France), and based his conclusions on a case history of relocation by the Société Nationale d'Etudes et de Construction de Moteurs d'Avion (the SNECMA Company) and two others at Sud-Aviation.

His findings were that:

"1. No national arrangements are made in France for the negotiation of job transfers and worker relocation by workers' and employers' organisations.

2. Consequently, the social answer to such problems is essentially provided by the firm, or even the individual factory. The provisions made are the outcome of various factors, such as the bargaining strength of the parties, the number of workers to be transferred, the management's approach to personnel problems, and so on.

3. In this industry, the overriding importance of the Government's function clearly emerges, both as concerns the workload and decentralisation policy.

4. In view of the two preceding factors and technical advances, it is apparent that the unions' attitude cannot reasonably be one of systematic opposition to such transfer and reconversion operations.

Arrangements should accordingly be made for negotiations at both national and firm level in order to afford maximum protection for the workers.

But to be really effective, negotiations should cover all aspects of the employment problem, i.e.:

- Vocational training and retraining;
- Planning of workload;
- Length of working hours;
- Recruitment conditions, etc.

5. Finally, reference should be made to a particularly important point - the lack of accurate information on the economic situation, employment forecasting and statistics about the labour force.

The goal of the French trade-union leaders is to discover answers which will best reconcile the two extremes, one consisting of general measures, largely inapplicable to the particular case, and the other of specific solutions, which are difficult to work out. It must however be admitted that the overall situation in the industry is such as to require no urgent decisions.

The Belgians want to stabilise production and employment.

Mr. R. Decoster notes that although in the F104 G affair all the unions had of course to acknowledge the economic and technical reasons underlying the redundancies, they took vigorous steps to cushion the impact.

The results achieved for redundant personnel vary from one company to another, and largely hinge on redundancy payments (itemised in the report), although the unions feel that the solution lies elsewhere, as is apparent from the following passages of the report:

> "The Belgian industry has not yet succeeded in achieving a stable level of production. It still experiences periods of high activity alternating with serious recessions resulting in large-scale redundancy. The only way of mitigating the undesirable consequences of this situation is to decide upon a number of measures to be applied both by the industry and the government.

As matters now stand the only possible course is to aim at some degree of diversification. As for the Government, it should undertake to expand aircraft production proper, and to regulate this activity if need be by transferring orders or parts of orders at international level; secondly, it should support the industry's own efforts to diversify production."

The Dutch want to overcome manpower shortages

The situation in the Netherlands is entirely different, a fact which both the unions and employers fully realise.

The Dutch worker's main concern is steady employment, which he regards as far more important than the wage rate. The Dutch aircraft industry must therefore attempt to deal with temporary labour surpluses by internal transfers, for if compelled to look for work on the external labour market and re-employed outside the industry, most of the workers would never return. Under these circumstances, there can be no question of "temporary layoffs", since the worker would be gone for good. Recourse must be had to a great variety of measures to spread the risk and stabilise the level of employment owing to the external labour market's rigidity.

The policy of the aircraft industry must therefore be to retain its personnel. When the level of employment drops in a particular division, the personnel department can take the following action, in order of seriousness:

(a) Find similar work in another department;

(b) Find work, even if less suitable, in another department;

(c) Place their workers on a waiting list, who then spend their time on call at the factory canteen;

(d) Transfer to short-time working;

(e) Resort to dismissal.

The cases most frequently reported are (a) and (b). A prerequisite for their success is a fairly varied production range, which the Dutch aircraft industry has so far achieved by sharing in international projects, mutual subcontracting arrangements, and some amount of diversification. Another prerequisite is versatility (taakverruiming), meaning that the worker should be able to undertake several types of job.

In avionics the most pressing problem is the manpower shortage, whether in Great Britain, the Netherlands or Belgium. The reports all stress this aspect, and the unions have only had to settle individual cases which were negligible in scope.

Present trends of trade-union action

Situations are so diverse, related problems of an economic and sometimes political nature so different, and new changes occur at such a rapid rate that no common approach by the organisations of the four represented countries emerged from the seminar.

The most that can be done, in a preliminary analysis, is to outline a few trends marking trade-union action, and point out differences from one country to another, illustrated by a few examples.

The unions and partial reconversion

During the seminar a French delegate mentioned a case of partial reconversion consisting in the manufacture of wooden caravan trailers by Sud-Aviation. The experiment however was unsuccessful, since this type of work is far removed from that ordinarily performed in the aircraft industry, and was directed towards the production of a commodity which is unlikely to be in great future demand.

Generally speaking, attempts to diversify production have had but marginal results, except in the Netherlands, and have not fulfilled expectations. The experience in Europe is corroborated by that in the United States, where aircraft companies have tried to diversify by engaging in the production of such items as aluminium canoes, artificial hands, parts of musical instruments, and even stainless-steel caskets. These attempts were eventually abandoned. A similar fate befell the manufacturers of guided missiles. Such failures show that it is extremely difficult to adapt high-precision equipment to the production of consumer or industrial goods.

Rather than seek permanent reconversion, the aim might be to attenuate fluctuations in the volume of production by causing aircraft companies to fill orders on behalf of other firms, as in certain tooling jobs. At any rate, this is the impression gained from opinions expressed at the seminar.

The unions and full employment

If diversification is not a solution, the best way to make work for redundant aircraft workers is to ensure both regional and national full employment. This means that the aim should be - under a policy of full employment - to prevent certain regions and towns from relying too exclusively on aircraft production. In many European countries, experience in such industries as textiles, shipbuilding and coalmining has shown the disastrous effects of unemployment in a region or district which places undue reliance on a single industry. For this reason steps should be taken to create other employment opportunities in areas which depend mainly on the aircraft industry.

Attempts to create new jobs with financial or other support from the government have however had discouraging results in a number of countries. A representative of the C.G.T.-F.O. (France) thus reports that firms agreeing to extend their activities into other regions are apt to employ a high proportion of semi-skilled workers, few highly trained workers, and only a smattering of technicians and engineers. He moreover points out that many jobs created with the help of public funds in France have eventually had to be suppressed owing to the economic and financial difficulties of such firms.

In order to assess working and redeployment conditions correctly, better manpower statistics are urgently needed and aircraft occupations should be reclassified so that further training programmes can be planned for substitute jobs which aircraft workers will be able to fill.

The unions and redundancy

All the trade-unionists were agreed on one point - which was that efforts should be made at firm and national level to protect workers against any marked depletion of their resources owing to dismissal.

All the countries concerned have national unemployment insurance schemes. In the United States, the unions for several industries have succeeded in obtaining annual guaranteed wage rates, which are negotiated at firm level and supplement State-allotted unemployment benefits. In France a mixed system has been instituted, which if need be can be applied to aircraft workers.

But the most instructive example is the British scheme. In dealing with the problem, the British trade-unions decided in favour of governmental measures: increased unemployment benefits and a redundancy payments scheme. Their aim was to ensure that a redundant worker would receive sufficient resources until he found a job in which his qualifications and experience could be used to best advantage. The line of reasoning they followed, was that technological progress and structural changes should in no way be hampered owing to the workers' fear of seeing their earnings considerably reduced.

The British Redundancy Payments Act set up a fund financed by contributions from all employers, which serves to reimburse them for part of their payments to workers dismissed because of redundancy. These allowances are based on the wage, seniority in the firm, and age of the worker, and may amount to as much as $3,500 if his length of service so warrants.

One striking aspect of the seminar was the increased awareness of these problems on the part of the British trade unions, as partly evinced by their readier acceptance of changes needed in the structure of employment, including geographical mobility, following a set of measures taken by the Government to guard workers from the effects of such changes. While pointing out various defects in the schemes which were adopted, the British delegates acknowledged that they had done a great deal to promote a favourable attitude towards the changes. Moreover, the fact that a Labour Government was in power created a climate of trust.

The members mentioned instances in other countries of redundancy-payment agreements reached by the unions and companies.

Stress should here be laid on a general trade-union tendency, which is not to seek a guarantee of maximum worker protection in the event of "economic accident", but, better still, to promote timely action obviating the occurrence of such accidents, since they can now be foreseen.

The unions and vocational training

The members of the seminar dwelt at some length on the subject of vocational training. It will be noted that most of the reports described the general mechanisms of training, and some the structures applicable to the aircraft industry.

All the union organisations brought out certain specific points:

- To enable redundant workers to find other employment easily, training must be of a comprehensive kind enabling a wide range of skills to be obtained, which specialisation for an individual job is incapable of providing;
- A broader range of skills is an ever more pressing requirement, if only because of the steadily decreasing ratio of manual workers to non-manual workers. This situation, while not restricted to the aircraft industry, is one that particularly affects it. The delegates mentioned instances of in-service training for gardeners, hairdressers, bakers, etc. in aircraft assembly, drilling and riveting jobs, etc. No doubt this is a rapid way of training people, but should they become redundant, such highly limited skills will not be of much use elsewhere. Such methods enable a man to be trained for a succession of separate jobs without really fitting him for a particular trade.
- As a whole, the delegates considered that vocational training and retraining efforts were quite inadequate in all the western European countries. The fact that governments and employers had failed to solve this problem satisfactorily was everywhere made apparent by the acute shortage of skilled manpower.
- The measures recently taken by the British Government to improve vocational training possibilities consequently aroused the keen interest of delegates from other countries. A marked feature of the Act introduced for the purpose in Great Britain is that firms offering no suitable training are compelled to help pay the costs of those that do. A Central Training Council composed of representatives from management, labour and education has been set up, whose job is to lay down the broad lines of a national training policy. Training boards have been established for each industry and are empowered to levy contributions from the industry concerned, and to use the money to organise training establishments or pay compensation to firms who already operate an approved training programme.
  Training centres run by the Government also exist, but so far they have only provided training for 6,000 workers per year.

- A subject that came in for extensive discussion was how to stop the brain drain in science, technology and other highly skilled branches from the European aircraft industry, where training requires heavy investment. The drain was of particular significance in Great Britain. The delegates wondered whether it was of any real use to engage in such expenditure to train skilled personnel if they were to emigrate in increasing numbers. To meet this problem, one suggestion was that loans be granted for study at technical schools and universities, which graduate recipients would be bound to reimburse if they decided to emigrate. Since the drain of scientific personnel was due to the disparate growth of research and development in the United States as compared with Europe, the delegates believed that one way of keeping scientific and technical personnel in Europe would be the government-sponsored expansion of civilian research and development projects.
- A crucial question for the European aviation and electronics industries was whether they should go on trying to maintain and expand the scientific and technical staff needed to sustain a greater research and development effort, or whether they should resign themselves to being largely dependent on non-European technological advances.

It should be noted that training problems at the seminar were chiefly approached from the standpoint of aims and structures. It might be well to question trade-union leaders on research done in connection with the training of adults, particularly the content needed in general education to promote rapid adjustment in a new speciality.

Future prospects

In opening the seminar, Mr. Solomon Barkin, Deputy to the Director for Manpower and Social Affairs and Head of the Social Affairs Division of the OECD, proposed a list of 25 questions. These will be found in the supplement to the final report, on pages 5 to 9, under the heading Introductory Statement and Questions.

In his general report on the role and attitude of trade unions, Mr. Robert Cottave, Deputy Secretary General, Fédération nationale des ingénieurs et cadres, Force Ouvrière (France), also outlined a number of topics of discussion for the seminar.

Even though the task is a difficult one, some of Mr. Barkin's questions may profitably be combined with various subjects suggested by Mr. Cottave, and commented on in the light of the seminar discussions.

Threats to the stable employment of aircraft employees

Mr. Cottave defined the attitude of trade unions in the following terms:

Technical progress called for no particular comment, neither in the trade unionists' reports nor in their statements. While no undue optimism or pessimism is shown, such progress seems to be an accepted fact. All realise that, whether in the aircraft and electronics industries or in any other leading economic sector, the era of technological change we live in is no isolated, accidental, or hopeful occurrence, but a continuous process. Despite occasional pauses from one year to the next, it is bound to gain momentum with the passage of time. This is a view generally held by the trade unions.

To achieve stability of employment, the trade unions have adopted a dual attitude:

- On the one hand, major actions in France, Belgium and Great Britain are taken on a national scale, at the level of government, which is primarily expected to define a civil and military aircraft policy in an international context, and if possible one of international co-operation;
- On the other hand, the trade unions' attitude towards management no doubt is less conventional. Owing to the desire for job security, the unions naturally try to prevail upon management to stabilise the level of company activity. Proposals vary according to country. Mr. Decoster thus notes that the Belgian aircraft manufacturers should develop technical contacts with foreign companies. European co-operation should be furthered so as to achieve a balanced rate of activity in each national industry, whether in the civil or

military sector. Mr. Vos stresses opportunities for diversification, whenever the same skills used in aircraft production can be used to manufacture new products. The list might be continued, but it will suffice to note that pressure is now exerted by the trade unions on the company's economic and trade policy.

Levels of trade-union action to promote stable employment

In the absence of any slackening in the economy (France and the Netherlands), the trade unions are quite content to stop at company level, although they would carry their action further in the event of serious difficulties. Mr. Cottave's remark will be noted:

> "Most characteristic, however, seems to be the trade unions' determination to take a direct hand in solving employment problems at the most difficult stage. Thus the Belgian unions (Mr. Decoster) asked to share control in fulfilling exceptional orders. A French union (Mr. Laroussinie) proposed that it should assume direct responsibility in a relocation project. In these instances approval by the employers or government authorities was not forthcoming, but in the Bristol case described by Mr. Scanlon the trade unions, in spite of management opposition, were alone in implementing a readjustment policy they had themselves defined and in organising suitable machinery for the purpose. The principle of a voluntary movement by labour was the policy basis used. This required a continuous flow of comprehensive information through media set up by the unions, describing both job opportunities and assistance available under the law and the company contract. Strict control also had to be exercised over measures taken in the meantime by management, particularly where working schedules were concerned. Supported by adequate legislation, the operation was a success, upsetting a good many firmly entrenched notions."

Need a recent trade-union action be recalled in connection with a government project? The design and construction of a modern aeroplane may cost as much as $150 million. Yet according to latest estimates, the supersonic Concorde will entail an expenditure of at least $1,400 million, and it was the overwhelming steepness of this price which caused the project to be so severely criticised. Mr. J.M. Riche, of "Air et Cosmos", a French publication, recently wrote in the "Times" that:

> "It may now be reported that action by the trade-unions was essential towards the project's retention."

In supporting the project, the English and French trade-unionists were protecting the jobs of tens of thousands of workers.

Growth prospects and their impact on employment

Omitting any consideration of military programmes, subject to such now evident hazards, attention should presumably be directed to civilian transport. It seems to be generally agreed that passenger traffic will continue to expand at an annual rate of some 10 per cent during the next five years. It is estimated that by 1975 about 5,000 aircraft will be needed to take care of total traffic, marked by dominance of the United States. The 11 American airlines fly nearly three times as many passenger miles as the 10 European lines put together, and the United States purchases half of all civil aircraft. In his introductory report Mr. O. Vesey Holt describes the prospects of European aircraft workers as follows:

> "There will always be at least one United States company competing in any worthwhile aerospace market and the American company can always count on the preference of the American airlines unless an overseas machine offers exceptional advantages. This means that the American companies can count on a substantial production run in pricing their aircraft. Against this background it is extremely doubtful whether the market for any one type of aircraft will support more than two non-American producers at anything like reasonable profits. In this situation, employment prospects for individual workers are largely dependent on the success of the firm for which they work in contributing a successful aircraft. The consequences of failure are likely to be regionally highly significant, and the trade unions concerned are, for better or for worse, dependent on the commercial success and acumen of the management of aircraft companies. As British experience has shown, it is not sufficient to rely on the market provided by individual national airlines. They have to compete internationally and provide too small a market to enable manufacturers

to bring down costs to competitive levels. Clearly, the European military and civil market would provide a more satisfactory basis than any individual national market. However, in the military field, the total N.A.T.O. market would still only be 20 per cent of the United States market and the political realities of the present situation make it unlikely that this will be a homogeneous market in the immediate future. The European civil market amounts to about 40 per cent of the United States market and could provide a market particularly for short-haul aircraft. Indeed, if national airlines could be induced to give reasonable preference to European aircraft in this category, a suitable aircraft would have an excellent market.

To sum up, air transport is booming, and this means that substantial numbers of aircraft will be bought over the next ten years. The United States aircraft industry has a built-in cost advantage in both military and civil aircraft and aerospace equipment because of the size of its home market. Europe can only hope to compete with the United States by developing work on a Europe-wide basis. In the present climate of opinion, this is likely to be done on an inter-nation basis, and the main problems likely to arise for union members are regional ones resulting from changes in government policy or lack of competitive success."

Experience thus confirms that it is the overall aspect of government policy which is of major concern to trade-union organisations.

It may be well in this connection to re-examine the contingency of an international disarmament policy, as analysed by Mr. Freeman, in order to ascertain the relevant assumptions of labour organisations. This suggestion at any rate denotes the magnitude of the issues involved in trade-union attitudes towards the governing authority.

The stimulating effect of the aircraft industry, its executive, technical and worker personnel

Experience shows that from aircraft research and development stem new techniques, materials and products that can be adapted for use in other industries. To what extent should such indirect benefits to other industries be taken into account in deciding whether or not to maintain an aircraft industry?

In pleading the case for their sector, the British delegates to the seminar raised this very question, all the more tellingly as their arguments were based on official investigations already mentioned in the present report.

A Committee of Inquiry appointed by the British Government to study the future prospects of the aircraft industry - named after its chairman, Lord Plowden, and one of whose members was Mr. Fred Hayday, National Industrial Officer of the National Union of General and Municipal Workers (NUGMW) - issued its report in December 1965, which mentions the following examples of such a technological fallout:

(a) Materials: The demands of aviation have led to the development of materials with high strength/weight properties, often coupled with resistance to high temperatures. These have found applications in other branches of engineering. High-strength aluminium alloys and titanium are examples. Titanium was developed only recently for high speed aircraft. Ten years ago the aircraft industry was the sole customer for it, but now nearly half the British production is sold outside the industry.

(b) Digital computors: The development of digital computors received a great stimulus for their use in military aviation.

(c) High-pressure, light-weight hydraulic systems developed for military aircraft during the Second World War, and since applied to all sorts of mechanical, civil engineering, mining and other equipment.

(d) Gas turbines, now used in industry to provide extra power for the electricity grid at peak periods, and at sea to power a growing range of warships and other vessels.

(e) Electronics, radar and radio: Aviation provided an initial impetus, and most modern developments arise from aviation demands. Printed and potted circuits, micro-miniaturisation, transistors and other solid-state devices are examples: all are profoundly affecting computers, radio, television, tape recorders, etc.

In summing up the impact of this fallout, an important conclusion reached by the Plowden Committee was that "it seemed probable that no other single industry would have such a pervasive effect on the technological progress of the nation."

But it also acknowledged that it was difficult to gauge whether comparable or larger benefits could be achieved if the 9,000-odd scientists and technologists working in the aircraft industry were deployed in other ways. Moreover, it remains to be seen whether, should the existence of the aircraft industry be at stake, the majority of these scientists and technologists - not to mention the engineers, draughtsmen and technicians - would be prepared to transfer their skills to other industries. Thousands have already emigrated to the United States as a result of cutbacks in British aircraft construction projects.

After careful investigation, the Plowden Committee concluded that there would probably be a significant loss to the nation's technology in the short-term if the aircraft industry disappeared altogether or suffered a large and speedy contraction. The short-term qualification is important, since the Committee goes on to say that in the long-term the strength of the fallout argument would depend on how much money and effort the Government was willing to expend in systematically encouraging the use of advanced technology throughout British industry.

Additional documentation was available to the members of the seminar in the form of papers reproduced in a supplement to the final report, in which special consideration is given to American trade-union experience in the industry. These confirm, if any added corroboration were needed, the advanced position of the aerospace industry. The fact is one which the trade unions well understand, and reliance is placed on government in various ways. Leonard Woodcock, a leading trade-unionist in the United States, spoke in March 1965 as follows: "The more a particular company is dependent on government contract, the less control it has over the job security of its employees, and the wider the swings in job possibilities there can be", and he showed how important it was for the Government to protect such valuable manpower capacity.

> "Implemented with imagination, vigor and adequate funds, the humane and practical programs suggested could provide job and income security for the nation's aerospace workers and put an

> end to the inequality of treatment they now suffer. Such programs could also help eliminate shortages of skilled labor that arise from time to time in the defense industry, and could make an important contribution to the kind of national manpower policy which is critically needed in these years of rapid technological change."

It seems that the argument is gaining ground and that the idea of a special treatment for aircraft workers is slowly evolving. At a lower level, the example of the Netherlands is revealing: those who leave the aircraft industry will never return. If this is a loss for a firm, how much greater is the loss for the national community? It makes no difference whether the orders are for government or civil programmes: it is the technique and the technicians who are precious.

Mr. P. L. Siemiller, President of the International Association of Machinists (U.S.A.), in an address delivered in April 1966 (reproduced in the supplement to the final report) summed up the American union attitude as follows:

> "Once a skilled workforce has been scattered to the winds it takes money to recruit a new one. It takes time and money for training. Either directly or indirectly the government bears these costs. But a greater cost is paid by the workers themselves. It is their income that is interrupted. It is their lives that are uprooted. It is their mortgaged homes that are often lost.
>
> Perhaps it is not possible to smooth out all the peaks and valleys of aerospace employment. This is an industry in which a missile or a plane can become obsolete before it leaves the drawing board. It is an industry in which the purchasing decisions of the largest customer - the government - are subject to political considerations. It is an industry in which the military may propose and the White House may veto. Or the military and the White House may request - but the Congress may deny - appropriations.
>
> So there will always be a certain amount of insecurity in aerospace. But I submit that the Department of Defense and industry could both do more to moderate the endless cycle of boom and bust that keeps the aerospace workforce in a state of chronic insecurity.

The 50 billion dollars which the Department of Defense spends each year represents half of the Federal Government's total expenditures. This is not only a lot of money but it is a lot of responsibility.

We know the Department of Defense engages in many kinds of long-term planning. Spokesmen for the aerospace industry have suggested at earlier briefing sessions that within the limits of national security they need timely access to these long-range plans in order to develop their plans.

I am suggesting that the unions representing workers in the aerospace industry also have a right to know the direction of defense planning. We have a right to make suggestions as to how the Department of Defense can synchronize military necessity with social need. We have a right to expect that there be planning for people as well as for production."

A few questions and answers

To compile a list of the main problems discussed by the seminar is a difficult enough task in itself, but to these must be added various other subjects - though not all can be mentioned - touched upon by the participants both within and outside areas covered in the reports. A few leading questions were these:

- What dimensions must be achieved to warrant consideration of an aerospace programme?
- Are military projects really essential for the growth of civil aviation?
- Do military projects not obscure the cost-price concept?
- Do demands for wage increases have less chance of success when the construction programme is linked to a government loan?
- Does not the growth of air transport depend on many outside conditions (infrastructure, rate co-ordination, specialisation agreements, etc.) over which the unions have little control?
- Is the establishment of a vast European market a rational prospect?
- How can opportunities be so broadened for scientists as to offer at least the attraction of material benefits?

- Can co-operation in some areas be envisaged with the United States?
- How can trade-unionists assess the economic position of an enterprise if access is denied to sources of accounting, financial and trade information?
- Are compensation (for time of assembly or maintenance) plans desirable when an order is placed on a foreign market?
- How should the ratio of investment to work productivity be assessed in production development?
- Can a national industry rely for its existence on the use of foreign licences or should an endeavour be made to develop national research?
- What changes in behaviour and attitudes can creative, young, professionally skilled men introduce into labour organisations?

Most of the questions asked by Mr. Solomon Barkin were countered by other questions. This should not be taken to mean that the issues were evaded, but simply points to the complexity of the problem approached.

At this stage three conclusions can nevertheless be drawn from the seminar:

1. The importance of aeronautics in Europe will ultimately depend on how soon one of the main recommendations of the Plowden Committee can be put into effect: the first step should be to promote a European aircraft industry with the aim in the longer term of bringing about a broader partnership between a European industry and the United States industry in an Atlantic market.
2. The need to establish a European aircraft industry was also the principal conclusion of those who participated in the seminar. Several participants however considered that this would not be possible unless the airlines adopted a common purchasing policy so as to achieve market stability for the European aircraft industry.
3. The papers presented by trade-union leaders generally showed a firm grasp of present conditions on the part of their organisations. But, in conformity with the Western pattern of society, the unions are worried about future developments.

> It is true that forecasting, however unreliable it may be in the economic sciences, can even less be depended upon in the social field. And it is towards collecting the data needed for such forecasts that the trade unions appear to have directed their major efforts.

Even though limited in scope, the Regional Trade Union Seminar analysed in these pages can but have impelled trade-union leaders to bear far-reaching economic issues in mind at all times. In so doing, one of the aims set by the organisers of the Seminar will have been amply achieved.

MAJOR ISSUES
AND CONCLUSIONS

by
Solomon Barkin

The seminar enabled trade unionists from the aircraft industry and the electronics sector working for the aircraft industry in the four countries to discuss their problems together and acquire an understanding of each other's attitudes and policies. They recognised that greater urgency was attached to problems of the industry itself than to those of personnel and manpower. Satisfaction with present arrangements for employees in the industry varied. Delegates views on the level at which solutions should be sought also varied according to the seriousness of the situation in their respective countries. In some cases an overall national programme was considered best; while in others special industry arrangements or plans for groups of employees within the industry were advocated.

The point of departure for discussion in this seminar, was the problem of adjustment for employees in an industry undergoing rapid economic and technical changes. The aircraft and aircraft branch of the electronics industry provided a contrast with one another and with the common lot of industries. The basic issue was whether the job opportunities in the aircraft industry should be preserved and at what level they should be maintained: Atlantic community, European, national, plant or job. The decision would condition the nature of the proposals for specific manpower adjustment programmes and the degree to which occupational or geographic mobility within the industry might be expected or could be arranged.

Political economic issues

The participants understood that the determination of the level and area of employment stability involved delicate economic and political considerations. The fundamental fact was that the most economic aircraft manufacturing unit was greater than the traditional national boundaries of the countries at the seminar. The size of the funds for research and development and size of orders needed for competitive production dictated a larger-than-national business unit. The governments of several countries,as well as a number of companies,had learned this lesson and had entered upon joint projects and licensing agreements and embarked on programmes of specialisation, which at least preserved some part of the market for them,without involving direct competition with American producers. Belgium, the Netherlands and the Federal Republic of Germany were in this category.

The delegations from the two larger countries saw these issues most poignantly for they had had independent national aircraft industries which had hitherto shared in the world and national markets. They had in recent years found parts of their industry had been closed; had lost markets; and their national military and civilian air fleets had acquired aircraft produced abroad. New joint efforts on civilian aircraft manufacture had recently been undertaken by them to pool their resources on an agreed upon product. There was considerable support for these projects among the delegates,who hoped thereby to preserve the skilled and professional and technical personnel and the industry's productive capacity.

The trade unionists were keenly interested in government policies for co-operative efforts either on a European basis or in an Atlantic grouping of nations for the pooling of efforts and capacity. They favoured an agreement to undertake the building of a European air-bus.

The participants also recognised that whatever decisions might be made concerning the level and the nature of production in the aircraft industry, the problems in the aircraft branch of the electronics industry were quite different. In this branch, there were enterprises which produced a variety of products, though not necessarily in identical plants. They were constantly expanding and starting production of new items especially in the aircraft or space branch which gave them scope for production of new specialities.

The electronics industry, which had become accustomed to a high turnover in products both for the military and civilian industries they served, had come to look upon the instability in aircraft production as only another source of unsteadiness in their highly changing industry. It had, moreover, grown accustomed to shifting from single unit to repetitive production and back again and had built its own outlook on the assumption of the frequent recurrence of these moves. The personnel programmes of the industry also reflected this underlying instability. Against a background of continuing growth, they had been largely able to absorb these shifts without severe dislocations, and by general adherence to programmes of internal plant or enterprise adjustment of employees, with relatively minor resort to layoffs. This experience stood out in sharp contrast to the aircraft industry particularly in Britain and the United States.

The common feature of both industries was the high rate of technical change affecting materials, methods of production and output. Similarly unit production often shifted to large-scale output and back again; the emphasis on design became converted in time to a preoccupation with a high volume of output. Occupational functions were altered frequently to constitute new jobs and responsibilities. Worker flexibility was therefore a highly prized quality. Occupational movements demanded frequent acquisition of new skills and knowledge. There was a movement from manual to non-manual jobs and even in reverse where there was freedom of transfer.

No such generalisation could be made respecting geographical movement. The material at this seminar on France and the United States illustrated the importance of the problems of mobility; Belgium and the Netherlands had few such problems.

Adjustment programmes

Another major area of discussion was that of the mechanics for cushioning personnel adjustment to economic and technological change. Most participants first described the programmes established within the plants and the enterprises. This emphasis was quite reasonable since as union leaders their preoccupation was largely with this area. The specific programmes in each country and major plant were outlined together with their advantages and disadvantages.

The union representatives underscored that in Europe, where the countries enjoyed a high level of employment and an abundance of job opportunities, workers had relatively little difficulty in finding new employment after they had been released from old jobs. In the United States, the experience had been different. The American unions placed considerable emphasis on methods of facilitating the re-employment of redundant aircraft workers, particularly through the formation of an industry unit or, as a minimum, a unit of defence workers within the industry who would be assured preferential re-employment rights on jobs, irrespective of where they appeared, thus entitling them not only to assistance in retraining, but also to geographical transfers if the new employment became available in new localities.

There was an evident trend among the unions to try to interest the government in providing the aircraft workers with special assistance in adjustment in view of the high rate of exposure to economic, technical and locational changes. The American unions, as noted above, asked the government to grant the workers in the defence aircraft sector the same privileges as other defence workers employed directly by the government. They, moreover, endorsed and urged wider use of special task forces of governmental agencies to help in the re-employment of the workers made redundant by the cancellation or completion of aircraft orders. They emphasised that this phase of the personnel problem should get equal, if not greater attention than the recruitment aspect for which the governmental agencies appeared quite ready to organise special governmental task forces.

The British delegation reported that their unions were gratified with the development of nation-wide systems of improved financial benefits for redundant workers established through the improvements in unemployment benefits and the national scheme for redundancy payments. They underscored that these provisions had relieved the worst effects of redundancy, so that the British worker gave evidence of an increased willingness to accept the need for structural changes in employment patterns, including geographical mobility.

All countries reported that the plants had developed training systems for all levels of employees from the lowest manual to the highest professional grades. These were particularly useful as the employees had to acquire new skills and know-how with the introduction of new machines, new materials, and the substitution of new jobs for old. Job transfers were very common in these organisations and with each such shift some instruction and training were desirable. The enterprise systems of training were usually supplemented by programmes run by public or industry authorities.

The European trade unions, with the possible exception of those in Great Britain, had not yet given the problem of manpower adjustment within the aircraft industry the organised consideration which it might merit. The adverse experiences were new, and furthermore, the continued high levels of general employment and the abundance of alternative job opportunities had moderated the pressure upon them. They therefore recognised in this conference the occasion for advance analysis and thought, so that they might be better prepared to recognise and deal with these issues. The plans and proposals of the American unions were particularly interesting to them as providing some guidance from other unions.

There was a widely held judgment that adequate and varied national programmes for adjustment to occupational and geographical changes for all groups of workers should get the highest priority in the unions' list of demands. The more adequate these general programmes were, the more limited and specific would be the supplementary programmes for the particular group of workers. They preferred this general direction of development to reliance on specific rounded plans oriented primarily if not exclusively to the problems of workers in this industry. The countries in which geographical transfer constituted a major issue, perceived that this might be best dealt with by enterprise agreements.

General observations

The trade unions in this industry had become concerned with the sweeping and rapid economic and technical changes taking place in them and recognised that they had to be given special attention in future union policy. They noted that their own studies and investigations were limited and called for careful investigations and forecasts by public authorities so that they and the enterprise would be better informed about the future problems and difficulties and thereby be afforded advance warning of these problems. Their own studies had in all cases to be supplemented by studies by the government, since the latter had much of the relevant information and had to make the critical decisions.

As for the adjustment programmes to change, the unions were inclined to look upon the enterprise programmes as the first line of defence to assure continued employment of their members within the industry. They therefore stressed the need for transfers of employees from jobs which had disappeared to new ones which had been developed and for training programmes within the enterprise which could be supplemented by public plans. But as concerns provisions for redundancy and unemployment insurance benefits, they stressed the importance of national universal programmes which might be supplemented by special grants by the enterprise.

The trade unions both in France and Great Britain, and particularly the latter, were much concerned about the future of the industry and were preoccupied with promoting programmes and schemes which would preserve the industry within their own countries and on the European continent. This issue was uppermost in their minds and they indicated how they were promoting this position in their respective countries. While this was their main stress in the area of public policy, they were not overlooking their normal concern with working out protective programmes and systems of adjustments for employees who were affected by economic and technical change.

BACKGROUND PAPERS

SITUATION OF MANPOWER IN THE AEROSPACE INDUSTRIES IN EUROPE

by O. Vesey Holt,
Northampton College of Advanced Technology,
United Kingdom

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Section I

The Structure of the Aerospace Industry

(a) Changing technology

At the beginning of this century, man was hardly off the ground. To-day he is almost on the moon. Only the related industry of electronics has shown technological progress similar to the aircraft and aerospace industries. The rate of progress has been terrific - literally. The pre-war aeroplane was a relatively simple structure with piston engines attached and a few instruments to control it. It was relatively easy to manufacture and it used technology not yet too divorced from that of the general engineering and motor industries. The war provided a tremendous stimulus to technical development. The British and German industries separately developed the gas turbine engine. The German industry introduced the pioneering missiles which led the way to to-day's ballistic missiles and modern space technology.

The revolution in propulsion, which makes current aviation speeds up to five times as fast as those achieved by aircraft during the war, has brought with it a corresponding development in airframe technology. The control requirements have led to the consideration of aircraft as integrated systems rather than as an assembly of separate components. Military and civilian requirements have led to substantial advances in the development of the helicopter and other more advanced methods of achieving vertical take-off. The achievement of supersonic speeds in aircraft and rockets has led to the development of new materials for which there was no requirement before.

This has been work at the frontiers of human knowledge, but it has not been achieved for nothing. The cost of aircraft has increased strikingly. A wartime fighter plane cost about $30,000 to produce, whereas the last generation of manned fighters cost about $1,500,000 each. The cancelled British TSR2 was estimated to cost about $150 million to develop and about $3,000,000 for each production plane. A new subsonic airliner and a new engine could cost a minimum of $150 million to develop and about $9,000,000 for each aircraft. As for a supersonic aircraft, the latest estimate for developing the Anglo-French Concorde aircraft is $900 million including $150 million for testing and development.

It is not only the scale of change which has been vast, but also the rate of change which has been exceptionally high. This has meant that there have been frequent changes in military requirements which have sometimes resulted in the sudden cancellation of expensive projects with consequent employment problems. It has also meant that civil airlines have been compelled to replace aircraft well before their useful life was over, because a new development has rendered existing equipment competitively obsolete. From this have developed arguments for seeking to avoid the waste of resources which it is said is inherent in allowing precipitate technical development of this kind. The problem would appear to be a practical one. There may be good arguments for controlling the rate of innovation in industry. They have been advanced by manufacturers in the gramophone industry for delaying the introduction of long-playing records and by employers in the oil industry for holding back on developments in lubrication. In practice, they have rarely worked because someone has always been prepared to innovate where there is profit. It is likely that we shall have to live with whatever rate of progress our scientists and technologists achieve, or else see someone else somewhere else in the world come forward and exploit the idea we were holding back.

However, one of the implications of the high cost of development is that governments are increasingly underwriting the development cost of civil as well as military aircraft. Only American aircraft manufacturers have any possibility of absorbing these costs and even they could not do so without indirect government help from military work.

There is no reason to believe that the trend to increasing complexity will be arrested or reversed. Indeed, the problem of recovery of development expenditure in relation to expected sales is one of the central difficulties of the aerospace industry and it is likely to get worse not better.

One of the advantages believed to accrue from being involved in aerospace is described as 'technological fallout'. In other words, the indirect technological benefits to other industries which arise from the application of technology developed in aerospace work. In considering the future of the British aircraft industry, a recent Government committee examined this aspect very carefully and commissioned Arthur D. Little Ltd., a well-known firm of American management consultants, to investigate the significance of technological fallout in the United States. Their report discounted the significance of direct technological transfer except in one or two isolated cases where an enterprising businessman had seen the possibility of direct transfer, as for instance in the case of the digital computer. They concluded that: "Disappointment (at the lack of transfer) stems principally from those sources who because of the exigencies of domestic politics feel motivated to overestimate the applicability of very advanced technology to the needs of commercial enterprise". The committee however considered that there were at least five areas where direct transfer from aerospace work to civilian applications could be seen:

1. Materials. The development of light-weight materials of high strength, e.g. titanium originally developed for the aircraft industry is now used as much outside the industry.
2. Computers. Referred to above.
3. Mobile hydraulic systems originally developed for aircraft. Now used extensively in all kinds of engineering, earth-moving and mining applications.
4. Gas turbines. Used as prime movers in applications such as the small-scale generation of electricity.
5. Electronics, Radar and Radio. Dealt with in another paper, but transfer occurred in the case of radar and navigation equipment.

It is clear that one of the motives for any nation engaged in aerospace must be the desire to be in contact with the frontiers of progress. It is equally clear that on short-run costing grounds it is unlikely that such a policy can be justified. How much a nation can afford to spend in this area is very much a matter for national debate. It is hard for a British author to argue the case for very large expenditure on these grounds, but it is equally hard to refrain from drawing the parallel between the frontiers of technology and the frontiers of science. It has long been accepted that there is no need to demonstrate a connection between the pursuit of pure scientific knowledge and direct social benefit. Such activity is justified as part of the human search for knowledge. The frontiers of technology are just as worthy of investigation and just as likely to yield long-term benefits. Try estimating the long-term technological fallout from Newton's apple. But then Newton did not have to get the approval of a parliamentary committee to pick it - it fell!

(b) Cost factors

The costs in the aircraft industry have the following features. First, the capital employed per worker is high. Of course, capital per worker is highest in the United States - perhaps three times the European average, but even in Europe, aircraft production is a capital-intensive industry. Second, the proportion of development expenditure to total expenditure is high.

Even in conventional aircraft manufacture the proportion of research and development expenditure as a percentage of net output is much higher than in general manufacturing industry. Typical figures are 36 - 38 per cent for aircraft as compared with 3 - 6 per cent for general manufacturing industry. This means that the length of the production run is vital to profitability. If an aircraft takes $75 million to develop and $3 million to produce (exceptionally low figures by to-day's standards) the table below gives the costs per unit at different levels of sales:

Numbers sold	Total cost (Million $)	Cost per unit (Million $)
-	75	75.00
25	150	6.00
50	225	4.05
100	375	3.75
150	525	3.50
200	675	3.37

These figures show the crucial effect of the size of the market in pricing aircraft.(This will be referred to later in the section on the demand for civil aircraft). It will be seen, however, that the producer who can reasonably hope to sell 200 aircraft can think in terms of a price nearly $380,000 less than one whose market would be only 100, and $600,000 less than one whose market would be only 50 aircraft.

These are not the only savings connected with sales volume. In any complex manufacturing operation improvements which result in cost reduction take place during the initial production run, and may in fact proceed for quite a time after production has commenced.

In aircraft production the rate of progress has resulted in production runs which, although they may run into four figures, are small in relation to the complexity of the product even for the largest producer, and cost reductions can be expected throughout the life of the product.

A quantitative comparison of the learning factor suggests that, for every doubling of the production run, costs reduce to 90 per cent of what they were previously, thus giving a further significant production cost advantage to longer production runs. These cost advantages deriving from long runs,have been sufficient to give United States manufacturers an advantage of between 10 and 20 per cent over their European competitors for all but the most successful European aircraft, despite the fact that initial manufacturing costs in Europe are somewhat lower than in the United States of America.

It has also been noticed that American aircraft manufacturers find it possible to develop new aircraft faster than European manufacturers. This is no doubt in part due to more efficient operation, but in part it is probably the learning process which results not just from long runs on a single model but from a learning factor arising from the scale of development work. There are, of course, also the normal economies connected with increasing scale of operations which occur throughout manufacturing industry.

A particular problem for trade unions in the aerospace industry is that the normal test of profitability for seeking wage advancement is less likely to apply than in other industries. In the space programme and on military work, which form the major part of total expenditure on aerospace work, profits may not be as significant a factor as in a normal manufacturing enterprise. There are two reasons for this. First, much of the work is in the nature of research and development. In the case of the space programme, this is true of almost all the work done. Here profits are likely to be strictly controlled and the possibility for normal manufacturing profits does not exist. Even in the case of normal manufacturing work in connection with military contracts, the limits of profits are, in fact, closely controlled because of the dependence of manufacturers on their governments for future business. This was clearly demonstrated in the negotiations with the British Ferranti Company which followed the disclosure of unusually high profits on a missile contract. Although there was little doubt that the company had a legal right to the profits, the government succeeded in obtaining a substantial repayment because of its power to withhold business from the Company. In such cases, even though wages and salaries appear to be determined by the employer, governments are usually the ultimate arbiters.

(c) Location

For the time being, the centre of gravity of the European aircraft industry is in France and Great Britain. The United Kingdom aircraft industry employs approximately 250,000 workers. The labour force reached a peak of approximately 310,000 in 1957 but has fallen steadily since then. The Government Committee on the Future of the Aircraft Industry (the Plowden Committee), which reported at the end of 1965, declined to forecast the future size of the industry but envisaged a further substantial decline. This decline might well be accompanied by a more than proportionate decline in the size of the labour force, since productivity in the United Kingdom aircraft industry does not compare favourably with either France or the United States. Indeed, it is estimated that American productivity is about three times that of the British, and French productivity (in the aircraft industry) about one-and-a-half times better than that of the United Kingdom. The decline in the size of the United Kingdom aircraft industry has already led to a drastic reduction in the number of firms in the industry. This re-organisation was promoted by the Government, which used its power as a purchaser of both military and civil machines (for use by the nationalised airlines) to reduce the number of companies to two major groups manufacturing airframes - Hawker Siddeley and British Aircraft Corporation; two major engine firms - Bristol Siddeley Engines and Rolls Royce; and a helicopter firm - Westland Aircraft, plus a number of smaller firms. It looks as though there may be at least one more major merger - between Bristol Siddeley Engines and Rolls Royce - which would leave the industry with only one engine firm.

The French aircraft industry employs approximately 85,000 people and has built up an international technical reputation over the last ten years. The two major airframe manufacturers - Sud Aviation and Nord Aviation - are both nationalised concerns under direct government control. As will be seen from the list of co-operation agreements in Appendix 3, the French industry has built up extensive links with Britain and Germany in both the civil and military fields, the most notable of these projects being the Franco-British project for the construction of the Concorde supersonic airliner.

The German aircraft industry has, in the immediate past, been developing its potential through the production of a substantial amount of American equipment under licence. It has been one of the leading participants in the inter-European consortium for the construction of the Starfighter. The German industry employs about 30,000 people and is expected to remain at about this level. One of its features is that there is substantial American participation in the ownership of the industry. There is also a French holding of 25 per cent in one of the main German firms.

All the other European countries have developing aircraft industries, but for the most part they are involved in the production of equipment under licence or in the work of international consortia rather than in the production of whole aircraft. The main exceptions to this are the Netherlands and Sweden. In the Netherlands, the industry is dominated by the Fokker Company whose remarkable success with the Fokker Friendship is by now well known. This aircraft, besides involving firms throughout Europe, has the rare distinction of being manufactured under licence by the Fairchild Company in the United States. Indeed, the development of this aircraft together with the Starfighter programme, constitute the most hopeful concrete evidence of the feasibility of inter-European co-operation in the future. In Sweden, the S.A.A.B. Company produces military aircraft for the Swedish armed forces, making Sweden the only country of her size which is self-sufficient in aircraft.

(d) Employment

Location has also an important relationship to labour and employment problems. The aircraft industries of Europe are geographically dispersed. Inter-European co-operation is not likely to alter this. However, this is not to say that severe local problems cannot present themselves. Even to-day, the size of individual production units for either airframes or engines is so large that they are likely to form a substantial part of the employment opportunities in any single community. This situation is likely to get worse rather than better. There has been a steady increase in the size of the optimum technical unit and, as aircraft grow in size and the production run grows longer (for light aircraft), the cost advantages will move still further in favour of large units. These considerations suggest that a high degree of planning and co-ordination will be desirable to avoid dislocation and consequent unemployment. It raises the question of whether more effective allocation of resources could not be achieved if there were an alternative to the normal approach of rewarding the firm which produces the most successful design for a new aircraft by allowing that firm to produce it. Consideration must be given to making sure that no resources are under-utilised because the firms concerned were not successful at the design stage.

The influence of the rapid rate of technical change is shown by the high proportion of non-manual workers in aircraft production. In a modern aircraft works, the ratio of manual to non-manual workers is already one to three. This situation is bound to develop further in favour of the non-manual worker. Already an increasing proportion of the design and testing work in the aircraft industry is carried out with the help of analogue and digital computers. The design of modern aircraft would be impossible without them. Now developments in the automatic control of machine tools - numerical control - offer the possibility of making inroads into work which had previously been regarded as the province of the skilled and semi-skilled worker. The skilled worker of the future will require a combination of skills quite different from that which has been the tradition to date. While he will still require an intimate knowledge of the properties of the materials with which he is working, these materials will probably be different from the ones with which he is working now. Certainly, even if they are the same, his contact with them will be even more remote than it is to-day. Instead of a machine tool between him and the work, there will be a computer between him and the machine tool. He will perhaps be something of a cross between a laboratory technician, a computer programmer and a toolmaker. As for the unskilled workers, there the proportion will have fallen further still. There has been much pessimism about what this fall in the proportion of unskilled workers will mean. To the author of this paper, it presents a challenge to develop the potential of those presently described as unskilled. This challenge can only be met if unions and management work together to see that systematic retraining programmes are provided to fit men for new jobs as their old ones become superfluous. The possibilities should not be underestimated. Techniques which seem to us to be immensely complicated will be accepted by our children as commonplace. After all, when Arabic numerals were first introduced into Europe, gifted men thought addition and subtraction impossible to master. Tomorrow's skilled workmen will be programming computers with the same ease that to-day's control their machines, providing that they get the training that is needed. Being at the forefront of technical progress, the aerospace industries can expect to encounter these problems before the rest of industry and the pattern of relations which it sets may well provide the standard for the rest of industry. It is being increasingly accepted that Government has an important role to play in this field, which is discussed further later in this paper.

Section 2

The State of the Aerospace Industry in Europe

(a) Introduction

World expenditure on aerospace products is currently running at a rate of about $17 thousand million. Purchases by governments account for about 85 per cent of this total. However, the United States alone accounts for 75 per cent of all the world's military and space expenditure and 50 per cent of the world's civil aircraft purchases. This means that American policy largely determines the international pattern of expenditure. For instance, the fact that expenditure on military aircraft is down by about 25 per cent and expenditure on missiles is up by 180 per cent is largely explained by changes in United States defence policy.

(b) The demand for military aerospace products

The American market for military purposes is largely closed to outsiders for, as a general rule, she prefers to rely on her own resources for defence needs.

The Society of British Aerospace Companies has estimated the demand for military aircraft and guided weapons excluding strategic missiles outside the United States of America, to be as follows:

	1965-69 $ million	1970-74 $ million
World, excluding United States and United Kingdom		
Military aircraft	6,425	8.990
Military aircraft spares.	2,570	3,600
Guided weapons.	1,636	1,988
Total	10,631	14,578
Add estimated British expenditure	4,200	4,200
Total estimated military expenditure. . . .	14,831	18,778

It is estimated that European sales will amount to about 65 per cent of this market, the balance being to non-European countries excluding Eastern Europe and China.

In so far as the European sector of the market is concerned, changes in defence policy and in East-West relations could lead to big revisions of these figures and the present climate of relations makes it look more likely that they would be revised down rather than up. Indeed, it is probably the existence of this doubt about the permanence of the military requirement which causes most uncertainty about the labour situation in the European aerospace industry.

The non-European sector of the market for military aircraft is largely conditioned by available funds. While the developed European countries will have no difficulty in this respect, the calls on the funds of the emerging nations are enormous, and complex military aircraft may not have a high priority. It could be that the emergent nations will, however, provide a good market for second-hand equipment and thus indirectly help the market for new equipment.

(c) Space developments

The conquest of space fires the imagination and also burns large quantities of money. The United States space programme is currently running at more than $4,000 million and a further $1,500 million is being spent annually on space work by other United States Government Departments. Much of the expenditure on the space programme, which is operated by the civilian National Aeronautics and Space Administration, goes to traditional aircraft companies. The eight largest contractors are all firms which have been long established in the aircraft industry (North American, McDonnell, Douglas, Boeing, General Dynamics, General Electric and Aerojet). Approximately 77 per cent of N.A.S.A.'s appropriation is being spent in industrial firms. The same procurement arrangements apply to the military obligation, the main component of which is the construction and launching of the manned orbiting space laboratory.

At the time of writing this report, the future of European space research on an international basis is in extreme confusion. There are two main European bodies concerned with space research.

The European Space Research Organisation (ESRO) and the European Launcher Development Organisation (ELDO). ESRO comprises twelve countries: France, Germany, Great Britain, Italy, Sweden, Belgium, the Netherlands, Switzerland, Spain, Denmark, Austria and Norway. It is developing facilities for space research in the Netherlands (a research centre for scientific satellites), Germany (a data processing installation), Sweden (a launching site for rockets) and various other facilities such as tracking stations and a plasma centre. So far as is known at the present time, the future of this programme is reasonably sure.

The European Launcher Development Organisation comprises six countries: Belgium, France, Germany, Great Britain, the Netherlands and Italy. Ironically, this project, developed largely at the instigation of the British Government to provide for the continuing development of the British Blue Streak rocket, is now in question because of the announced intention of the British Government to withdraw. It now looks as though successful international action will induce the British Government to change its mind in the same way as it did over Concorde.

The French national effort is the only complete national space project within Europe. Expert opinion in the United Kingdom has recently acclaimed the results achieved on a relatively small budget. However, even taking all the European projects together, the European space effort is very small compared with the American programme. ELDO, even at present estimates, should not cost more than $360 million in total. In the United States, the space programme

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has provided a means of taking up the slack left by the declining military aircraft programme, and the technological problems which arise are increasingly seen to be related to those arising in connection with the development of supersonic aircraft. It may, therefore, be in the long-term interests of union members to try to ensure that there is a steady and continuing European space programme. It will be difficult to restart space effort once it has been stopped and the skilled teams have been dispersed.

(d) The demand for civil aircraft

Air travel

This involves consideration of the market for air travel. The demand for air travel is booming. In 1945 the world's airlines carried about 9 million passengers, by 1955 this had risen to 68 million, and by 1965 to 180 million people. Over the last ten years, the average annual increase in the number of passengers carried has been nearly 11 per cent per annum. The potential of the market is still tremendous despite these dramatic increases. Even in the United States it is reckoned that 60 per cent of the population have still to make their first flight. The European market has hardly been touched, and, as incomes in Europe rise to American levels, so can the demand for air travel be expected to rise, provided that government policy does not seek to protect existing transport systems at the expense of the airways. In fact, last year within Europe the number of passenger kilometres flown increased by 15 per cent to 12 billion; in the other market in which European operators have a substantial share - the North Atlantic - the number of passengers carried went up by no less than 17.7 per cent. Furthermore, in this market, where the airlines compete directly with the established maritime carriers, the position has now been reached where not only is all the increased traffic being carried by air, but the airlines are cutting into and reducing the absolute number of passengers going by sea. So far as airlines within Europe are concerned, the only factor which might restrict the growth of air traffic is the comparative compactness of the continent. It is reckoned, even in the United States, that for distances of under 200 miles the airlines are at a distinct competitive disadvantage. This is mostly because of the length of time that it takes to get from the city centre to the airport as compared with the total journey time - a fact of which those who fly from Paris to London are only too painfully aware. Within Europe there are many such distances, although the sea gap between England and Continental Europe goes some way to offset this. Two sets of factors operating in opposite directions are likely to be working. First, improved city centre to airport transport is being developed in most European countries, and airlines are taking an increased interest in vertical take-off possibilities. Second, with United Kingdom-continent traffic, the construction of a channel tunnel could greatly increase the attractions of rail travel. However, even taking this into account there is no doubt that there will be a further rapid expansion in the total demand for air travel over the next ten years.

Air freight

The development of air freight is even more dramatic than the passenger market. The last few years, which have seen the introduction of the big jet, have brought a real breakthrough in freight carrying possibilities resulting in spectacular traffic growth. From 75 million ton miles in 1945 to 1,030 million ton miles in 1955, the figure reached 3,430 million ton miles in 1965, 27 per cent over the previous year. The increases in major markets are set out below:

Europe	18 per cent
North Atlantic	47 per cent
United States.	28 per cent

In the North Atlantic market, where the European airlines compete with the major American carriers, the traffic is split 60/40, Europe/United States, but the American share of the market rose slightly last year. However, the total air tonnage moved across the Atlantic (177,600 tons) is still quite small compared with the total tonnage moved by sea, so that despite the increase there is still vast traffic potential.

It may seem strange that, with this rapid growth situation, it should be necessary to consider the European aircraft industries against the background of a possible fall in the demand for their products. Indeed, it is the view of the author of this paper that this is the wrong approach to this situation. Nevertheless, it is perfectly possible for firms and nations to operate unprofitably in an expanding market. Many of the airline companies themselves have done this from time to time, either through unwise investment in aircraft which were made obsolescent too quickly or because of the failure of traffic expansion to keep pace with the carrying capacity acquired in the process of re-equipping the airline with newer and larger planes. The European aircraft industry has to live with two major factors of this nature.

Implications of increased carrying capacity

The first is the greatly increased carrying capacity of new aircraft. This has enabled the world's airlines to handle the increased traffic without a proportionate increase in aircraft numbers. For example, since 1950, B.O.A.C. have substantially reduced their fleet of aircraft despite a more than six-fold increase in traffic. Over the past ten years, the total number of passenger miles flown annually on civil airlines has risen by approximately 13 per cent per annum while the value of aircraft sales (adjusted for price changes) has only risen by 10 per cent per annum.

Future demand

It seems to be generally agreed that passenger traffic will continue to expand by about 10 per cent per annum for the next five years. Fortune-tellers who value their laurels are advised not to venture beyond this point; but those who do venture suggest that there might then be a slowing down in the rate of growth to about 8 per cent per annum. The British Ministry of Aviation estimates that, on the basis of a breakdown of forecasts by routes and length of journey, about 5,500 to 7,500 aircraft of to-day's types will be needed. However, there will almost certainly be a substantial increase in both the size and the speed of aircraft during this period; on this assumption, not many more aircraft will be required than are needed now. It is therefore estimated that by 1975 about 5,000 aircraft - mostly new - will be sufficient to carry this greatly increased traffic. This implies average annual sales of about 400, compared with about 300 in the last decade, assuming that about 1,000 aircraft now in service are still flying in 1975.

It is even more difficult and chancy to attempt to break these figures down further, but it is suggested that this total can reasonably be categorised into five different types of aircraft, for each of which there will be a demand of not less than 500 or more than 1,000.

The second factor is the dominance of the United States of America as a purchaser of civil aircraft. This, in turn, derives from the dominance of United States airlines in the transportation business. The world's top 25 airlines comprise 11 United States airlines, 10 European lines and 4 others. The 11 United States airlines flew just under three times as many passenger miles as the 10 European lines put together. In terms of purchases, the United States purchased roughly half of all civil aircraft. According to figures appearing in the United States publication "Air Transport World" at the end of 1965, United States airlines were operating a total of 1,870 aircraft and had on order a further 660, of which 38 were for European planes; whereas, at the same date, the major European lines were operating 612 planes and had 133 on order, of which 9 were European. It is ironic that the United States airlines had more European aircraft on order than the European airlines. It should be added that these figures do not include provisional orders,e.g., those for the Concorde. Looked at from the production angle, the dominance of the United States becomes even more impressive since United States production currently accounts for 80 per cent of world production in terms of value, whereas the British and French industries account for 8 per cent and 5 per cent respectively.

The implications of the American market for air travel are far-reaching. It means that American producers can rely on a home market which by itself is sufficient to support the manufacture of large modern aircraft. Despite the scale of their exports, their home market is nine times greater than their export sales. Other countries are much more heavily dependent on exports. For instance, the ratio for France in 1964 was 2:1 and for the United Kingdom 3 1/2:1. This has shown itself in inherent cost and development advantages which it is difficult for European manufacturers to overcome.

Conclusion

There will always be at least one United States company competing in any worthwhile aerospace market and the American company can always count on the preference of the American airlines unless an overseas machine offers exceptional advantages. This means that the American companies can count on a substantial production run in pricing their aircraft.

Against this background it is extremely doubtful whether the market for any one type of aircraft will support more than two non-American producers at anything like reasonable profits. In this situation, employment prospects for individual workers are largely dependent on the success of the firm for which they work in contributing a successful aircraft. The consequences of failure are likely to be regionally highly significant, and the trade unions concerned are, for better or for worse, dependent on the commercial success and acumen of the management of aircraft companies. As British experience has shown, it is not sufficient to rely on the market provided by individual national airlines. They have to compete internationally and provide too small a market to enable manufacturers to bring down costs to competitive levels. Clearly, the European military and civil market would provide a more satisfactory basis than any individual national market. However, in the military field, the total N.A.T.O. market would still only be 20 per cent of the United States market and the political realities of the present situation make it unlikely that this will be a homogeneous market in the immediate future. The European civil market amounts to about 40 per cent of the United States market and could provide a market particularly for short-haul aircraft. Indeed, if national airlines could be induced to give reasonable preference to European aircraft in this category, a suitable aircraft would have an excellent market.

To sum up, air transport is booming, and this means that substantial numbers of aircraft will be bought over the next ten years. The United States aircraft industry has a built-in cost advantage in both military and civil aircraft and aerospace equipment because of the size of its home market. Europe can only hope to compete with the United States by developing work on a Europe-wide basis. In the present climate of opinion, this is likely to be done on an inter-nation basis, and the main problems likely to arise for union members are regional ones resulting from changes in government policy or lack of competitive success.

(e) Specialised machines

Helicopters and vertical take-off

For some time now the helicopter, like the monorail, has been the civil transport method of the future. So far, costs and problems connected with noise have prevented its other admirable characteristics from providing the commercial success that always seems just round the corner. There are few, if any, unsubsidised commercial passenger-carrying helicopter services. The major commercial uses, apart from this, have been transportation operations in connection with oil exploration.

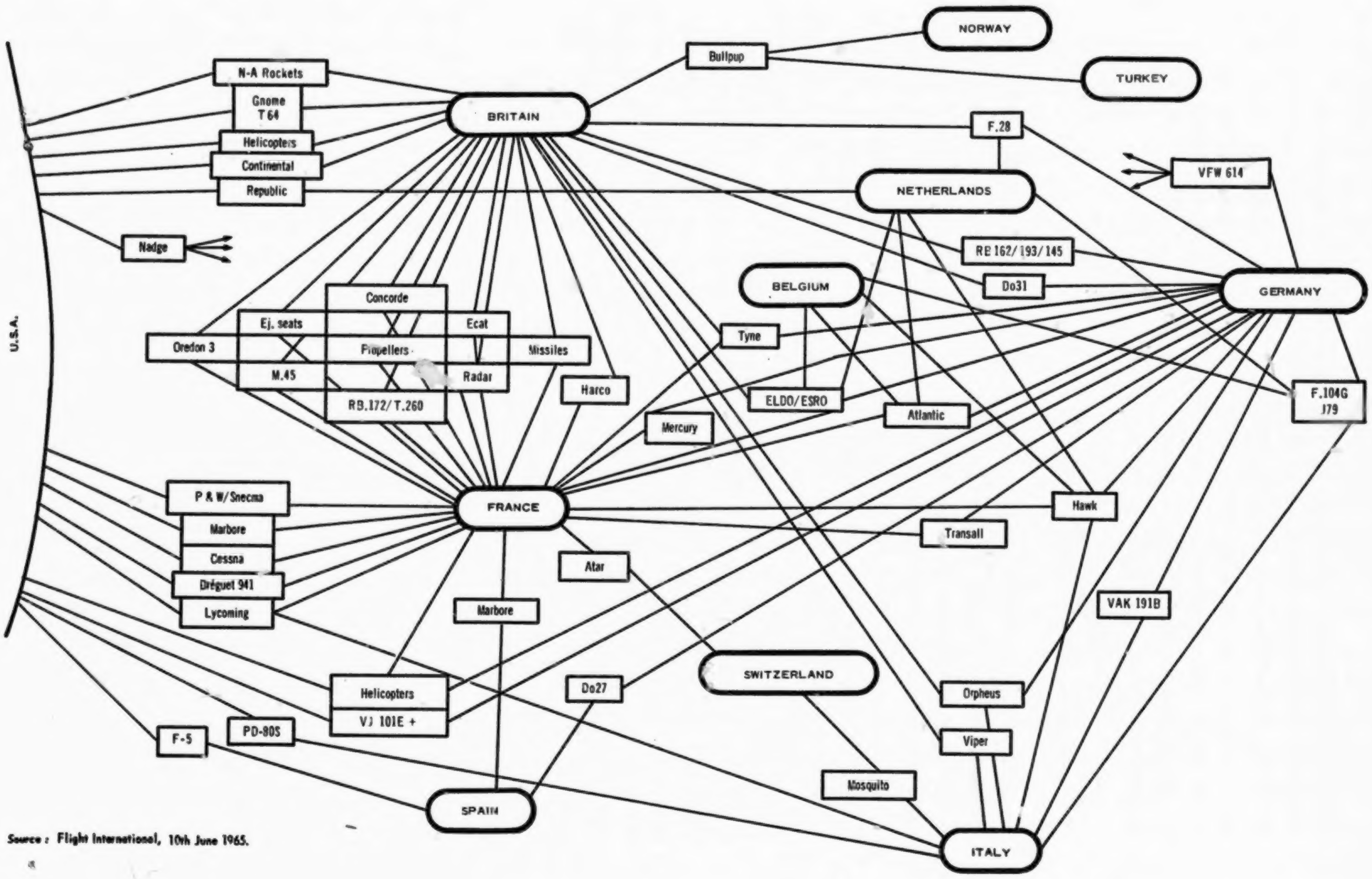
However, in military uses, the helicopter has firmly established itself, and its importance increases yearly. This year, the United States will be operating about 4,600 machines with its armed forces and the United Kingdom over 700. There is little hope of European manufacturers penetrating the American market, but it is estimated that the market in the rest of the world, excluding the Communist bloc, will amount to at least $10 million for the next ten years. It seems probable that, at least for the next few years, European firms will find it more profitable to adapt American designs than to embark on their own. On the other hand, intensive oil exploration in the North Sea has resulted in a useful increase in the demand for helicopters on charter which could lead to an increase in the demand for machines.

The market for private and company aircraft

The market for small aircraft is largely a function of income. It follows from this that once more the major market is the United States. Of about 135,000 light aircraft in service in the world in 1964, over 85,000 were in use in the United States. In Europe, there were about 3,800 in France, about 700 in Germany and about 1,300 in Great Britain. The high figure for France is due to the direct financial encouragement given by the French Government to users of light aircraft. The scale of resources needed to manufacture light aircraft is relatively small compared with other aircraft, and the market is one that can be expected to expand rapidly as income levels in Europe approach those of the United States. On the other hand, the nature of the market demands that aircraft be produced in advance of sales and held in stock, which increases the financial risk especially in launching a new model. There is clearly a European market for light aircraft which would support one or more European manufacturers producing a full range of products, but it may never get off the ground unless it is given some measure of protection against American competition because of the difficulty of persuading individual buyers to give preference to particular aircraft in their purchases.

(f) European co-operation

It is clear that the future lies in collaboration between European countries in the aerospace field. There is already a considerable network of such agreements as is shown by the diagram, and they are considerable in their importance. The role of governments in the development of these arrangements is of extreme importance, both for financial and political reasons. As has been seen in the attitude of the British Government towards the Concorde project and, more recently, towards the E.L.D.O. project, a change of government policy can have a major effect on the development of such projects, which can be a detriment to the employment prospects of union members. The effective trade union collaboration between France and Britain when the cancellation of the Concorde project was in question, underlines the need for trade union arrangements to take account of the new international character of the European aerospace industry.


NORWAY
Bullpup
TURKEY
N-A Rockets
Gnome T 64
Helicopters
Continental
Republic
BRITAIN
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VFW 614
NETHERLANDS
Nadge
U.S.A.
RB 162/193/145
Do31
BELGIUM
GERMANY
Concorde
Ej. seats
Ecat
Oredon 3
Propellers
Missiles
M.45
Radar
Tyne
RB.172/T.260
Harco
ELDO/ESRO
Atlantic
F.104G J79
Mercury
P & W/Snecma
FRANCE
Hawk
Marbore
Transall
Cessna
Atar
Dreguet 941
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Marbore
VAK 191B
SWITZERLAND
Helicopters
Do27
Orpheus
VJ 101E +
F-5
PD-80S
Viper
Mosquito
SPAIN
ITALY

Source: Flight International, 10th June 1965.

Although there is a considerable history of European collaboration in aircraft manufacture over the last ten years, recent developments have implied a fundamental change of approach. Early international agreements were either in the nature of straightforward sub-contracting or arrangements for the joint production of an existing aircraft design. The Fokker Friendship aircraft was produced on an international basis but with responsibility for the project firmly in the hands of the Fokker company. Even in this outstandingly successful plane, the international element in the project caused difficulty when the British government refused to allow Rolls Royce to supply engines for planes sold to Indonesia because they were at that moment in dispute with the Indonesian government. Even the Starfighter programme falls short of a truly international project since the design and development work are American.

The new generation of inter-European projects involve international design and development work. The crucial test of the success of these projects will be whether they can produce aircraft which will compete with the American industry both on cost and on performance. The difficulties are formidable: difficulties of language and custom; difficulties of standards and engineering practice; difficulties of method of approach and of temperament. They can no doubt be overcome, but to produce commercially successful aeroplanes they have to be overcome without adding too much to the cost of the aircraft which are produced. Of course, it is probable that most of the development costs will be absorbed by the governments concerned, and this will act as a partial cushion against the real increase in the cost of doing business in this way, but there are limits to the degree of subsidy that can be obtained.

There is no getting away from the fact that the development of European aircraft industry as an integrated whole presupposes political developments which are not at the moment practicable. It would be most unwise to place too much reliance on the present wave of enthusiasm for international co-operation. On the other hand, effective co-operation would seem to be the only way in which Europe can hope to have a viable aircraft industry in the future. It would, therefore, seem that trade unions in the aerospace industry have the strongest possible reasons for developing international pressure among themselves to ensure that governments do not allow short-term political considerations to impede the orderly development of projects already started. If co-operation does turn out to be successful, then the need for international union co-operation will become even greater. For instance, co-ordination on wages and conditions of employment will become even more essential, particularly as the differences in the cost of doing business in different countries become more fully established.

Section 3

Employment Problems

(a) Short-run employment problems

The short-run employment problems of the aircraft industry are in many ways similar to those of the shipbuilding industry and the motor industry. There is the same danger of a hiatus between orders that exists in shipbuilding and the same risk that a model which has been designed and tooled up may not appeal to the customer that exists in the car industry. It is not realistic to expect that any amount of international planning and co-operation will entirely eliminate these problems. It is possible to enumerate the steps which can be taken to mitigate the consequences. First, adequate redundancy protection is essential. Since redundancies are likely only when a firm is not in a good financial position, it is desirable that the state should participate in the arrangements. Second, union members have an interest in seeing that there is alternative employment available locally. As mentioned earlier in this paper, although the aircraft industry is widely dispersed, the units have become so large that they may well dominate the employment situation in a particular locality - the importance of Sud Aviation to Toulouse and of the old Bristol Group to its name town are cases in point. This may mean that the failure of a particular project will have quite disproportionate impact on the employment situation in the locality of the company concerned. Third, a generally high level of demand is extremely helpful in overcoming the local problems of a particular industry. It would appear that the reason why the cancellation of the TSR2 project in the United Kingdom caused so little direct unemployment was that there was a generally high level of demand at the time so that all workers released were re-absorbed into other industries without too much difficulty. Of course, political and practical considerations may prevent the achievement of these last two conditions in some countries. However, on military and government work, which comprises a substantial proportion of aerospace work, much can be done to secure continuity of employment by ensuring proper planning of contracts. The biggest obstacle to this is probably the tendency of government planners not to look at the real resources which lie behind their money decisions. It appears to be a general experience among trade unions that governments do not pay sufficient attention to these matters in the letting of their contracts. In a report by the International Association of Machinists and Aerospace Workers to the Aerospace Committee of the International Metalworkers' Federation, it is argued in respect of American industry that it is questionable whether the problem of job security can be actually solved through the process of collective bargaining: "We (I.A.M.) have requested that government assistance be given to the individual who is laid off, whereby he may be relocated, retrained and can establish himself without loss of income in gainful employment". It is hard to fault this conclusion, but its practical realisation is likely to be very difficult, although some progress is already being made in national schemes for redundancy compensation such as the one recently introduced into the United Kingdom.

However, redundancy and retraining schemes only affect those who have been laid off. Another area where protection is needed is in providing an appropriate share in new employment for workers already in the industry. As new skills emerge, existing workers should have the chance to retrain, particularly if their own skills are likely to be affected. This may involve government, employers and possible inter-union problems. The development of training programmes to meet the need for special skills - usually for defence purposes - suggests that, given appropriate techniques and proper selection, spectacular results can be achieved in training existing employees for new jobs.

(b) Long-run employment problems

Some of the long-run employment problems have already been covered in Section 1 of this paper. So far as Europe is concerned, the future is very uncertain. All depends on whether the new developments in international co-operation can produce aircraft which are as good as the equivalent American aircraft and as cheap. If they cannot, then, in those sectors where American airlines compete with European airlines, competition will probably compel European airlines to order American machines. It is possible that European airlines might be persuaded to give preference to European aircraft on inter-European routes, but even this is by no means certain. Assuming that Europe does not offset the likely decline in military expenditure with an equivalent space programme, the best that can be hoped for is that the present level of employment will be maintained. The most probable outlook, however, is for a decline in the level of employment which is likely to be more severe in the United Kingdom than in the rest of Europe. If this takes place against a background of full employment the national problems may not be serious, since the skills released are those which will probably be in short supply in other industries. This does not, however, rule out the possibility of severe local problems which may have to be solved by systematic reconversion programmes to take up surplus capacity, nor does it eliminate the need for governments to take advantage of their position as purchasers to bring employment to their own countries. The implications of this are discussed below.

Purchase-linked sub-contracting

It is possible to do this through direct procurement policies designed to confine aircraft purchases to national firms. This is becoming increasingly difficult outside the United States of America because of the economies of scale, referred to earlier in this paper, which apply to all aircraft purchases and because of the need to see that airlines exposed to international competition are fitted with the best possible equipment, wherever it may be produced. British experience in confining the state airlines to British aircraft has not been happy and the policy has been severely curtailed. A development of this policy, which seems to offer some possibility of combining the advantages of placing the order with the most desirable manufacturer and securing a share of the employment resulting from it, is to link the purchases with an agreement on sub-contracting. This policy has played an important part in the negotiations which led to the British purchase of the American F.1/11 fighter. It is hoped that as much as 45 per cent of the cost of these machines can be purchased from British sources. As yet, the practicality of these arrangements remains to be proved, but in principle they look to be a useful way of protecting the workers' interest where purchases of foreign aircraft are being considered. It may be that in practice there is a gap between the intentions of the negotiators and the detailed implementation in engineering terms. Similar arrangements to offset the cost of armament purchases from the United States of America by the purchase of British naval craft seem to be taking a long time to get off the ground. It would also appear that there are considerable difficulties in quoting delivery dates and prices where the aircraft into which the components are intended to go are already in production. The sitting contractors have advantages in terms of tooling and know-how which are very hard to overcome.

The international manufacture of aircraft for N.A.T.O. would suggest that it is essential for arrangements to be worked out in considerable detail in advance. The largest international project of this kind has been the European production of the F.104G Starfighter. This has been produced by an international consortium involving West Germany, Belgium, Italy and the Netherlands. Approximately 1,000 aircraft have been produced under this programme to an existing Lockheed (American) design.

In summary, British and European experience suggests that sub-contracting is likely to work only if the arrangements are planned as an integral part of the production programme for the aircraft involved. Statements about the volume of sub-contract work that will arise where an aircraft already in production is being purchased should be viewed with extreme caution. The only circumstances under which they are likely to be achieved is if legally binding obligations are imposed on the manufacturer. On the other hand, the manufacture under licence of overseas designs is a process which is well understood and is much more likely to succeed. In military purchases where speed may be the essence of the problem, this may not be possible; but in civilian production where speed is not as important, this approach could make use of the production facilities of firms whose designs have not succeeded in securing sufficient orders.

Measures for stabilising employment - Reconversion possibilities

An American study of the possible alternative products which could be used to take up spare capacity in aircraft industries has been made by Professor Seymour Melman of Columbia University in the course of a seminar on industrial reconversion. Its conclusions were that the aircraft industry only had a competitive advantage in those areas in which its advanced technologies could be fully used. Aside from aircraft and space products, the study cited five other industries offering the possibility of requiring the sort of advanced technical development that aircraft firms were equipped to make:

1. Rapid transit systems for high traffic density, urban and suburban, using either monorails or aircraft techniques applied to conventional railroads.
2. Construction. Housing and bridge building using factory techniques.
3. Electric-powered vehicles.
4. Hydrofoil boats.
5. Ground effect machines (Hovercraft).

As this particular survey was made in 1958, it shows considerable insight in its forecasts. Progress is being made in the design of rapid transit systems using both the approaches described. We may at last see a viable monorail in Europe. Not much progress has been made in applying aircraft techniques to the construction industry, but considerable progress has been made in industrialising building. The design of standardised bridges would still seem worthwhile in view of the tremendous number of relatively small bridges used in motorway construction. Not much progress has been made with electric power vehicles, although a great deal of money has been spent on overcoming the central problem of a practical source of power, and an economic "fuel cell" is thought to be just around the corner. In hydrofoil boats considerable progress has been made in both the United States of America and in Russia. It is, however, ground effect craft which have provided the most direct example of the possibilities of reconversion in Europe. In the United Kingdom, the development of the Hovercraft has been fathered by a government-financed organisation, the National Research and Development Corporation. It has formed a joint company with Westland Aircraft and Vickers for the production and development of Hovercraft, which are now being introduced into normal commercial service between France and England. In fact, so far, the most promising area of applications for aircraft technology and "know-how" seems to be the sea. Not only are there many similarities from a theoretical point of view, but there is the practical advantage of competing with an industry which has tended to be conservative in its approach to new techniques in recent years. A conventional nautical application, which may become of considerable importance in the near future, is in the manufacture of conventional light craft. With the increase in leisure time and incomes, a mass market for small sailing and power craft is developing which is well suited to the production facilities of aircraft firms. Both in the Netherlands and in the United Kingdom, the aircraft industry is involved in the manufacture of light craft.

The nature of industrial progress suggests that it is unlikely that new products can be developed for failing aerospace firms as a result of conscious planning by governments, but rather that the initiative will have to come from the management itself. However, the involvement of N.R.D.C. in the Hovercraft development suggests that there may be some virtue in making government funds available to "prime the pump".

Appendix 1

MAIN EUROPEAN AIRCRAFT FIRMS

France

Name of Company	Production (1)	1964 sales (in 1,000 U.S.$)	1964 sales in relation to 1963 sales	Net profits in 1964 (in 1,000 U.S.$)	1964 net profits in relation to 1963	Sector (2)	Number employed in 1964 (3)
Sud-Aviation	C	309,698	+ 11.7%	88	- 96%	N	27,692
Nord-Aviation. . . .	C	89,051(1963)	+ 11.1%	-1,793(1963)	-	N	9,665
Hispano-Suiza. . . .	P	40,510(1963)	+ 23.6%	779(1963)	+ 39%	P	2,280(1963)
Ateliers d'Aviation L. Bréguet	C	32,104	+ 53.2%	498	-	P	3,739
G.A.M. Dassault. . .	C	......	+ 48.0%	...	......	P	6,630(1963)
Turbomeca.	P	......	....	...	......	P	1,700(1963)

(1) C = frames, P = engines;

(2) P = in private ownership, N = nationalised

(3) Total number employed in French aircraft industry, in January 1963: 86,625:
49,300 building frames; 16,825 building engines; 20,500 for fittings.
(54.1% production workers; 36.7% clerical and technical staff, draughtsmen, supervisory staff; 9.2% engineers, cadres, navigating staff)

Source: International Metalworkers' Federation

Germany

Name of Company	1964 sales (in 1,000 U.S.$)	1964 sales in relation to 1963 sales	Net profits in 1964 (in 1,000 U.S.$)	1964 net profits in relation to 1963 net profits	Number employed in 1964
Messerschmitt A.G.	45,835	+ 15%	760	+135.7%	4,341
Bölkow GmbH (without WMD/SIAT)	37,500	+ 67%	...	....	3,700
Bölkow Group (with WMD/SIAT) (1)	55,000	+ 38%	...	....	6,150
Heinkel.	45,000	+ 61%	...	....	4,000

(1) This refers to Waggon und Maschinenbau GmbH (100% controlled by Bölkow GmbH) which in its turn holds 100% of the shares in Siebel-Werke ATG SIAT GmbH).

Source: International Metal Workers' Federation

Great Britain

Name of Company	1964 sales (in 1,000 U.S.$)	1964 sales in relation to 1963 sales	Net profits in 1964 (in 1,000 U.S.$)	1964 net profits in relation to 1963 net profits	Number employed in 1964
Hawker-Siddeley.	963,200	+ 5%	19,222	+ 7.4%	50,000
Vickers.	446,438	+ 14%	15,086(1963)	......	56,078
British Aircraft	326,710	+ 17%	2,811	-47.6%	42,000
Rolls Royce.	297,892	+ 4%	10,304	- 8.2%	43,549
Bristol Aeroplane Company Ltd.	....	.....	5,936	+11.1%	......
Westland Aircraft.	85,196	.....	9,376	......	10,000

Source: International Metalworkers' Federation

Italy

Name of Company	1964 sales (1) (1,000 U.S.$)	Trend of last sales figures	Number employed in 1964
Fiat	128,300	+ 58.8%	4,032 (2,365 aircraft) (1,667 engines)

(1) Aircraft manufacture only.

Sweden

Name of Company	1964 sales (1,000 U.S.$)	Net profits in 1964 (1,000 U.S.$)	Number employed in 1964
Saab	213,882	3,691	13,719

Source: International Metalworkers' Federation.

Appendix 2

EUROPEAN AND UNITED STATES COLLABORATION AGREEMENTS OF THE MAIN UNITED KINGDOM COMPANIES ON AIRFRAMES, AERO-ENGINES, MISSILES AND SPACE VEHICLES AS AT 11TH JANUARY, 1966

	Companies	Type of agreement	Product
BELGIUM	Rolls-Royce/ Fabrique Nationale	Sub-contract	RZ-2 rocket motor for Blue Streak ELDO satellite booster
ELDO	Hawker Siddeley Dynamics	Contractual agreement	Blue Streak rocket booster
ESRO	Hawker Siddeley Dynamics	Contractual agreement	ESRO II satellite
FRANCE	Bristol Siddeley/ SNECMA	Design and manufacture	Olympus 593 turbo-jet for Concorde supersonic transport
	Bristol Siddeley/ SNECMA	Design and manufacture	M45 turbo-jet (M45G for Anglo/ French variable-geometry fighter and M45H for VFW.614 jet transport)
	Bristol Siddeley/ SNECMA	Licence production	Hercules piston engine for Noratlas military transport
	Bristol Siddeley/ Turbomeca	Design and manufacture	Oredon turbo-prop

	Companies	Type of agreement	Product
FRANCE (cont)	British Aircraft Corporation/ Bréguet	Inter-governmental: design and manufacture	Jaguar supersonic light strike-trainer
	British Aircraft Corporation/ GAM Dassault	Inter-governmental: feasibility studies	Variable-geometry aircraft
	British Aircraft Corporation/ Sud Aviation	Inter-governmental: design and manufacture	Concord supersonic transport
	Hawker Siddeley Dynamics/ Engins Matra	Development and manufacture	AS.37/AJ.168 air-to-surface TV guided missile
	Hawker Siddeley Dynamics/ Engins Matra	Collaboration - design, development and manufacture of second ESRO satellite	ESRO II satellite
	Rolls-Royce/ Turbomeca	Joint development and manufacture	RB.172-T.260 turbo-fan for Jaguar supersonic light strike-trainer
GERMANY	Bristol Siddeley/ Klockner Humboldt-Deutz	Licence production	Orpheus turbo-jet for Fiat G-91 light fighter
	Rolls-Royce/ MAN-Turbo	Joint development	RB.145 lightweight turbo-jet for VJ.101C VTOL research aircraft
	Rolls-Royce/ MAN-Turbo	Joint development	RB.153 turbo-fan
	Rolls-Royce/ MAN-Turbo	Collaboration	RB.193 vectored-thrust turbo-fan for VFW VAK-191B V/STOL fighter

	Companies	Type of agreement	Product
HOLLAND	Short Bros. & Harland/Fokker	Membership of European consortium - including design and financial responsibility	Fokker F.28 twin-jet transport. Production of outer wings, etc.
ITALY	Bristol Siddeley/ Alfa Romeo	Licence production	Gnome shaft turbine for Agusta-Bell 204B helicopter
	Bristol Siddeley/ Fiat	Licence production	Orpheus turbo-jet for Fiat G-91 light fighter
	Bristol Siddeley/ Piaggio	Licence production	Viper turbo-jet for Macchi MB.326 jet trainer
	Rolls-Royce/Fiat	Sub-contract	RZ-2 rocket motor for Blue Streak
SWEDEN	Bristol Siddeley/ Svenska Flygmotor	Technical liaison	Ramjets
	Rolls-Royce/ Svenska Flygmotor	Licence production	Avon turbo-jet for SAAB Draaken supersonic fighter
UNITED STATES	Bristol Siddeley/ Marquardt Corp.	Technical liaison	Ramjets
	Bristol Siddeley/ General Electric	Licence production in United Kingdom	Gnome (GE T58) shaft turbine for helicopters
	Bristol Siddeley/ General Electric	Licence production/ option in United Kingdom	GE T64 turbo-prop/shaft turbine
	Rolls-Royce/un-named U.S. engine manufacturer	Inter-governmental	Development of new advanced lift-jet for V/STOL aircraft

	Companies	Type of agreement	Product
UNITED STATES (cont)	Rolls-Royce/ Continental Motors	Licence production/option in United Kingdom	Range of Continental piston engines for light aircraft
	Westland Aircraft/ Sikorsky	Technical liaison and licence production/option in United Kingdom	S.51, S.55, S.58 and S.61 helicopters
	Westland Aircraft/ Agusta-Bell	Licence production	Agusta-Bell 407 helicopter
	Westland Aircraft/ Bell Aerosystems	Technical liaison and licence production	Westland Hovercraft
YUGOSLAVIA	Bristol Siddeley/ Yugoimport	Licence production	Viper turbo-jet
		MULTI-NATIONAL AGREEMENTS	
FRANCE/ BELGIUM/ GERMANY	Rolls-Royce/ Hispano-Suiza/ Fabrique Nationale/ MAN-Turbo	European consortium for licence production (Belgium producing parts under sub-contract)	Tyne turbo-prop for Bréguet Atlantic maritime recce. aircraft and Transall C.160 military transport
FRANCE/ GERMANY	Rolls-Royce/ French Government/ German Government	Joint development - licence production	RB.162 lightweight lift-jet engine
FRANCE/ UNITED STATES	Bristol Siddeley/ SNECMA/Pratt & Whitney	Study agreement	Advanced by-pass jet for air-bus

Appendix 3

PRINCIPAL INTERNATIONAL AGREEMENTS ON CO-OPERATION

French Company	Foreign Country	Foreign Company	Object (technical or commercial)
Bréguet	USA	Grumman	"Atlantic" co-operation in USA
	USA	McDonnel	Technical co-operation BR-941 in USA
	England	Short Band H	Co-operation BR 941-942
		Hawker	Industrial agreement VTOL NATO
	Netherlands	Fokker	
	USA	Republic	
	Germany	Focke Wulf	
	Belgium	Sabca	
		Fairey	
	Britain	Rotol	Propellors under patent
	Netherlands	Fokker	Sub-contracting for "Friendship"
	Netherlands	Fokker	Manufacturing "Atlantic"
	Germany	Dornier	
		Siebel	
	Belgium	ABAP	
GAM Dassault	USA	Boeing	Industrial agreement VTOL NATO
	Britain	BAC	
	Australia	Australian Government	Constructing "Mirage III" under patent
	Switzerland	Swiss Government	
Hispano-Suiza	Britain	Rolls Royce	Co-operation agreement for construction "Tyne"
	Germany	MAN	
	Belgium	FN	
	USA	Cleveland	Agreement on manufacture and sales
	Britain	Martin Baker	Licence for ejectable seat

French Company	Foreign Country	Foreign Company	Object (technical or commercial)
Messier	Germany	Liebherr-Aero Technik	Licence for FIAT G-91 landing gear - Repair "Magister" and "Noratlas"
	Italy	Oleodinamica Magnaghi	Licence for FIAT G-91 landing gear
Nord-Aviation	Britain	Hawker	Licence CT-41 missile
	Britain	BAC	Draughting and manufacture missiles
	Belgium Canada USA	Fairey de Havilland Bell Aerosystem	Cargo plane STOL NATO
	Germany	Weser Flugzeugbau Hamburger Flugzeugbau	Draughting and manufacture of "Transall"
		Bolkow	Draughting and manufacture of missiles
	Sweden	SAAB	Licence for missiles CT-20
	USA	Bell	Licence for missiles CT-20-CT-41
	USA	US Army	Licence for missiles SS-11
Potez	Germany	Heinkel	Perfecting CM-191
	USA	AVCO	Patent for engines LYCOMING
	USA	Turbo Flight	Sales of P-840
Reims-Aviation	USA	Cessna Aircraft C	Licence for manufacturing CESSNA 172
SFERMA	USA	Beechcraft	Technical and commercial co-operation
	USA	IAS	Joint creation of SERIMA (Management Chateauroux)
SEPR	USA	Rocketdyne	Technical-commercial agreement
	USA	Thiokol	Technical-commercial agreement
	Italy	Bombrini Parodi-Delfino	Technical aid agreement

French Company	Foreign Country	Foreign Company	Object (technical or commercial)
SEPR (cont)	Netherlands	Poudrerie Royale Néerlandaise et Régie Nat. Inrichtingen	Technical aid agreement
	Belgium	Fabrique Nat.d'Armes de guerre d'Herstal	Technical aid agreement
Sud-Aviation	Britain	BAC	Study, construction, sale of supersonic transport
	USA	Rocketdyne (North American Div.)	Structure of containers for rocket engines
	USA	Lear	Landing system with no visibility (Caravelle)
	USA	Sikorsky	Technical agreement on "Super-Frelon".
	India	Indian government	Licence to manufacture "Alouette III"
SNECMA	USA	Pratt & Whitney	Licence for jets
	Australia	Australian government	Licence for "Atar 9"
	Switzerland	Swiss Government	Licence for "Atar 9"
Turbomeca	USA	Continental	Licence for turbo engines
	Britain	Bristol-Siddeley	Licence for turbo engines
	India	Indian government	Licence for "Artouste III B"
	Spain	ENMA	Licence for "Marbore II"

Source: International Metalworkers' Federation.

SITUATION OF MANPOWER IN THE ELECTRONICS INDUSTRY WORKING FOR THE AIRCRAFT INDUSTRY

by C.A. Freeman
University of Sussex
United Kingdom

1. Growth of the electronics industry

There are always difficulties of definition (1) in any new and rapidly expanding industry. These difficulties are compounded when it comes to international comparison. But there can be no reasonable doubt that, however defined, the electronics industry has been one of the fastest growing in the world for the past 50 years. The compound world rate of growth, in real terms, has probably been well over 10 per cent per annum throughout this period, that is, about three times as fast as the output of manufacturing industry as a whole. Among major product groups, it has probably been exceeded only by plastics and petro-chemicals.

Between 1950 and 1960, the rate of growth in the United States and the United Kingdom was still over 10 per cent, while in France, Germany and the Netherlands it was over 20 per cent, and in Japan higher still (Table 1). This may be compared with an average rate of growth of output in manufacturing (over the same period) of 3½ per cent in the United States and the United Kingdom, 6 per cent in France and the Netherlands, 10 per cent in the Federal Republic of Germany and 18 per cent in Japan. In every country with a significant electronics industry for which statistics are available, the growth rate of this industry was far greater than for manufacturing as a whole.

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(1) For the purposes of this paper, this definition is used: Electronic products may be distinguished from other electrical goods by the fact that whereas electricity flows through the circuits of both, the electron tubes (valves) and semi-conductors in the electronic products discharge, direct, control, or otherwise influence the flow of electricity.

In the 1960's, there has been some slowing down of the growth rate in Western Europe and Japan, but it is still higher than the average for manufacturing as a whole. This slowing down may be attributed primarily to the saturation of the domestic radio and television market and its transition to a replacement market. In the United States, on the other hand, the growth of the industry has been faster in the 1960's than in the late 1950's. The domestic market for consumer goods was saturated there much earlier than in Europe. The accelerated growth rate has been primarily due to the computer industry and more recently to colour television. It may be confidently expected that these factors will also lead to some renewed acceleration of the growth rate in the late 1960's in Europe also.

Figures for employment are less satisfactory than those for output. Firms which are manufacturing electronic equipment are often also manufacturers of conventional electrical, or other types of machinery. Whereas a breakdown of their final output is usually available, a breakdown of their employment is not always available. As labour productivity has been rising steadily, employment increases have been lower than output increases, but have nevertheless been well above the average for manufacturing as a whole. In the United States and the United Kingdom, the growth of electronics employment has been from half to two-thirds of the rate of output growth. The United States Department of Labour estimates that electronics employment rose from just over a quarter of a million in 1950 to over 900,000 (1) at the present time, representing an average compound growth rate of over 8 per cent. The growth of employment in France, Germany and the Netherlands has probably been at a slightly higher rate than this, but in the United Kingdom it has been lower - about 4 per cent per annum over the past ten years.

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(1) Other estimates range as high as 1,150,000 in 1966.

Table 1

Growth of electronic sales, 1950-63

	% increase in sales			% growth rate of manufacturing industry 1950-1960
	1950-1955	1955-1960	1960-1963	
United States				
Consumer goods	-2.3	4.3	9.1	
Capital goods	16.5	19.8	27.1	
Defence	28.3	10.4	15.9	
Total (excluding replacement parts)	13.3	9.7	15.2	3.6
France				
Consumer goods	21.0	28.2	15.4	
Capital goods (including defence)	39.7	10.7	17.0	
Parts	23.4	33.1	14.3	
Total	28.0	23.5	15.4	6.5
West Germany				
Consumer goods	22.2	22.0	-1.8	
Capital goods	21.8	15.8	22.6	
Parts	24.6	22.1	2.7	
Total	22.5	20.1	7.0	10.1
Japan				
Consumer goods	-	-	9.8	
Capital goods	-	-	47.5	
Parts	-	-	15.0	
Total	-	58.7	18.6	18.1
United Kingdom				
Consumer goods	7.9	10.3	3.7	
Capital goods (including defence)	18.4	4.3	10.3	
Parts	13.9	14.1	8.5	
Total	13.8	8.3	7.8	3.5

Source: "Economic & Statistical Bulletin", 9th September 1964, p.797

2. Principal sectors of the industry

Originally the electronics industry was virtually the radio industry and its products (domestic radio receivers), capital equipment for radio stations (transmitters and receivers) and components for both sectors. Nowadays radio communications equipment accounts for only a small part of the total output of the industry. On the consumer goods side, television sets have become the most important sector, while a whole new range of electronic capital goods have been developed and marketed since the war. The most important of these are the following groups:

(i) Electronic data processing equipment, including digital and analogue computers and their peripheral equipment.

(ii) Ground, marine and airborne radar and electronic navigational aids and guidance systems, including the associated computer systems. This includes missile and satellite tracking and detection equipment, and sonar.

(iii) Electronic and nucleonic measuring and testing equipment, including such instruments as oscilloscopes, signal generators, spectrometers and radiation detectors.

(iv) Industrial electronic control equipment, including machine tool control, process control, and the associated computing and data logging equipment.

(v) Other electronic capital goods, such as electronic heating and welding equipment, medical equipment, X-ray equipment, electronic teaching aids and simulators.

This list excludes telegraph and telephone equipment and conventional instruments for measurement and control. In both of these industries, electronic firms are heavily involved and electronic applications are growing fast.

In Japan and the E.E.C. countries, consumer products and their associated replacement components (resistors, capacitors, valves, transistors etc.) still account for more than half of the total output of the electronics industry. But in the United Kingdom capital goods and defence equipment with their components account for 60 per cent of the total, while in the United States their share is over 75 per cent. Because of the generally faster growth rate of electronic capital goods by comparison with consumer products, most projections

Table 2

Production of electronic capital goods by country, 1958-64

Value in $ million

	Year	Production				
		U.S.A.(a)	U.K.	West Germany (b)	France (c)	Japan
Electronic data processing equipment	1958	(410) 324 (d)	15	27	10	..
	1961	(895) 546 (d)	32	48	71	13
	1963	(1,240) 860 (d)	74	78		52
	1964	(1,375) 977 (d)	124	102	106	71
Radar and navigation aids	1958	1,121	115	5		10
	1961	2,500	119	13	78	17
	1963	3,759	168	13		25
	1964	3,810	185	23	144	32
Radio communication equipment . .	1958	425	64	1958 33 1961 75 1963 106 (e) 1964 107		28
	1961	755	71		46	35
	1963	1,054	80			51
	1964	1,169	86		84	61
Public broadcasting & . . . . . . transmitting equipment	1958	39	10			12
	1961	105	15		13	15
	1963	112	16			20
	1964	140	24		18	22
Electronic measuring test & . . . analysing instruments, incl. nuclear instruments & controls	1958	361	29	20		12
	1961	428	34(f)	38	22	15
	1963	490	49	55		17
	1964	517	58	58	52	19
Industrial electronic control.. .	1958	130	6	12		..(g)
	1961	155	34(h)	29	18	..
	1963	176	47	37		3
	1964	204	42	45	37	4
Other electronic equipment. . . .	1958	457	18	33		20
	1961	646	37	48	29	36
	1963	888	44	63		47
	1964	1,043	52	65	52	55
Total electronic capital goods. .	1958	2,857	257	129(g)	172	82
	1961	5,135	342	251	277	131
	1963	7,339	478	352		215
	1964	7,860	571	400	493	264

Source: C. Freeman,"Research & Development in Electronic Capital Goods", in "National Institute Economic Review", No.34, November 1965, pp.43-44.

(a) These are NIESR estimates.

(b) The German statistics are believed to exclude military equipment.

(c) No source of capital goods production by type of equipment was available for France; this breakdown was based on an analysis of sales to customers carried out by BIPE.

(d) The lower figures for computer production are those published by the Bureau of the Census. The higher ones (in brackets) are from the Electronics Industry Association and are stated to have a different basis of collection and coverage.

(e) The ZVEI statistics do not distinguish between these two groups; some evidence (Overseas Business Reports, 64-120) points to Public Broadcasting & Transmitting as being relatively more important compared to other countries.

(f) Excludes nuclear instruments and controls because the information is not available.

(g) Some electronic industrial control equipment may possibly be included in the totals for measuring and test instruments.

suggest that by the 1970's the capital goods sector will be the greater in Japan and the E.E.C. as well as in the United States and the United Kingdom.

Among the various categories of electronic capital goods, radar and navigation aids is the largest single group in the United States, United Kingdom and France (Table 2). This is due to the military factor, and it should be noted that this group also includes the large data processing complexes associated with missile guidance and tracking, early warning systems, etc. Among civil products, electronic computers and other data processing equipment are the most important category.

Products which are used in the aero-space industries are to be found in almost all categories of electronic capital goods, but unfortunately no separate statistics are available for those products which are incorporated in aircraft and missiles or which are used in their manufacture and testing.

All categories of electronic capital goods have enjoyed high growth rates recently, and their output has trebled over the past 7 years. The fastest growing sector has been the electronic computer industry and its various applications.

3. Electronic equipment used in aero-space products

As early as the First World War, military applications gave an important stimulus to the electronic industry, and radio communication equipment soon became an important part of almost every aircraft. The Second World War provided an even greater stimulus, especially through the development of radar equipment of all types. By the 1960's, the electronic equipment of some aircraft accounted for a significant proportion of their total cost. According to some sources it has been as high as 30 per cent (1), but a more usual figure is probably 10-15 per cent. For civil aircraft the proportion is lower, as they do not require the same sophisticated types of radar and instrumentation. However, an increasing proportion of civil aircraft are using complex radar and radio devices in addition to standard communication equipment, and by the

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(1) "Seventh Report of the Estimates Committee of the House of Commons", London, 1965, p.195

1970's instrument landing systems will come into more general use in civil aircraft.

In missiles and satellites depending upon the type of guidance system, the electronic equipment can account for an even higher proportion of total cost. Indeed, there is a case for regarding them as products of the electronics industry rather than of the aircraft industry. They are, in fact, manufactured to a significant extent by firms which are usually classified in the electronics industry - for example, by Ferranti and ITT. Because of the higher electronic content in missiles and in military aircraft, the aggregate electronic content of United States military procurement in 1965-66 was estimated at 42 per cent (1).

The aircraft and space industries have had a very important influence on the electronics industry in various indirect ways, as well as through their direct procurement of radio communication equipment, radar sets and guidance systems.

The extremely high performance standards specified for aero-space equipment and the large scale government endowment of research and development work have been primary factors in the accelerated improvement of electronic components of many types. The whole trend towards miniaturisation and integrated circuitry has been strongly promoted by aero-space requirements. This applies above all, of course, to the American electronics industry, but also to a lesser extent to the British, French and Dutch industries and now to an increasing extent to the German industry.

In addition, the aero-space industries have been an important market for new types of electronic equipment which, although not incorporated in the end-products of the industry, are used in the process of design, manufacture and testing. This applies, for example, to computers in the United States and to numerically controlled machine tools in the United Kingdom and the United States.

Total sales to government agencies account for about 60 per cent of final sales of the electronics industry in the United States and for about a quarter of the French and British. The proportion in Japan, the Federal Republic of Germany and most other West European countries is much lower - probably less than 10 per cent. In addition, about two-thirds of the total research and development expenditures in the American electronics industry are financed from Government sources and about half of the British and French expenditures. In the United States, the Department of Defense is by far the most important source of funds both for procurement and research, but the share of the National Aeronautical and Space Administration has risen very rapidly (Table 3).

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(1) "Annual Report of the Electronic Industries Association", 1965.

Table 3

Estimated electronic content of procurement by major United States Government Agencies, including R and D

$ millions for financial year

	1962	1964	1965	1966
Department of Defence	7,649	7,820	7,499	7,351
N.A.S.A.	742	1,170	1,450	1,600
Federal Aviation Agency	160	140	110	110
Total	8,551	9,130	9,059	9,061

Source: "Report of the Electronic Industries Association", 1965.

The aero-space market and particularly the military market differ in many important respects from the civil electronics market. Research and development are very expensive and often paid for by government in advance, whereas in the civil market R and D costs must be recouped from subsequent sales. Price factors play an extremely important part in competitive civil markets. They are much less important in the aero-space market relative to rigorous performance requirements. The marketing organisation can be very small for the military market, consisting primarily of "corridor-padders". It may have to be even larger than the R and D organisation for many civil products. Advertising may also be a heavy item of expenditure for consumer products, but can be negligible for military products.

Both for civil and military products the electronics industry is labour-intensive and capital-intensity is low. Fixed assets per man are lower than in almost any other major industry. Labour costs probably average nearly 40 per cent of total manufacturing costs in Europe and an even higher proportion in the United States.

4. Manpower patterns in the electronics industry

Although most sections of the electronics industry are labour-intensive, the economic differences between the aero-space market and the civil market result in major differences in the pattern of manpower deployment (Table 4).

Civil electronic capital goods have a pattern of deployment intermediate between the two groups shown above. Probably only about half the labour force consists of production workers, while scientists and engineers may account for as much as 20 per cent of total employment and may be widely employed in marketing, testing, production and administration as well as in research, development and design.

In Europe, there are also big differences between the pattern of employment in consumer products, civil electronic capital goods and military/space products. Detailed manpower data are not available in satisfactory form for Europe, but it is possible to identify some major differences between the European and American patterns. In each sector, the number of scientists and engineers as a ratio of total labour force is much lower than that in the United States. Whereas engineers and scientists account for over 20 per cent of total employment in the United States, they account for less than 5 per cent in Europe. This difference is partly due to the greater relative weight of military/space products in the American industry. But even within this sector, whereas about a third of all employees are engineers and scientists in the United States, the proportion in Europe is only about 10 per cent. The American industry employs far more engineers on non-production functions such as research, development, design, testing and marketing.

This difference is partly due to differing patterns of education and partly to differences in management attitudes and in techniques. The proportion of "technicians" and "draughtsmen" is far higher in Europe. In American military/space electronics and in civil capital goods, engineers and scientists outnumber draughtsmen and technicians

Table 4

Illustrative occupational distributions in electronics manufacturing, military-space and consumer production, United States, mid-1962

Percentages

Occupation	Military and space products	Consumer products
Non-production workers	60.0	30.0
Engineers and other technical workers	33.4	11.0
Engineers (a)	21.0	6.0
Technicians	7.7	3.0
Draughtsmen	4.7	2.0
Administrative and executive (b)	13.2	12.0
Clerical and stenographic	13.4	7.0
Production workers	40.0	70.0
Skilled:	12.6	6.8
Assemblers	5.2	-
Analysers and troubleshooters	1.1	5.1
Processing workers (c)	0.2	-
Machinists and repairmen	3.7	0.3
Sheet-metal workers	0.8	-
Tool and die makers	0.3	0.4
Welders	0.6	0.1
Carpenters	0.2	0.2
Electricians	0.2	0.2
Plumbers and pipefitters	0.2	0.1
Other skilled workers (d)	0.1	0.4
Semi-skilled and unskilled:	27.4	63.2
Assemblers	11.0	42.0
Inspectors and testers	3.1	14.4
Fabricating workers (e)	3.7	1.2
Processing workers (f)	3.1	1.2
Shipping and receiving workers	1.3	1.2
Material handlers, truckdrivers & labourers	0.3	2.2
Custodial and janitorial workers	1.5	0.4
Other semi-skilled and unskilled workers (g)	3.4	0.6
Total employment	100.0	100.0

Source: "The Implications of Reduced Defence Demand for the Electronics Industry", United States Arms Control and Disarmament Agency, September 1965, Wash. page 27.

(a) Includes such occupations as electrical engineer, electronics engineer, design engineer, industrial engineer, mechanical engineer, value engineer, test and quality control engineer, and chemical engineer. The occupational distribution for military and space products also includes a small number of scientists, such as physicists, chemists, mathematicians, and metallurgists.

(b) Includes such employees as managers and supervisors, foremen, salesmen, and personnel in purchasing, industrial relations, accounting, marketing and advertising.

(c) Includes such occupations as skilled electroplater and etcher.

(d) Includes such occupations as stationary engineer, millwright, blacksmith, and skilled machine tool operator.

(e) Includes such occupations as punch press, drill press, power brake, sheer, and saw operator, grinder, and buffer.

(f) Includes such occupations as spray and dip painter, oven tender, silk screen operator, plating machine loader, etching machine operator, degreaser, and cabinet retoucher.

(g) Includes such occupations as stationary boiler firemen, machine setup man, relief operator, and cabinet repairman.

by nearly two to one. The reverse is true in Europe. In fact, there are often three draughtsmen and technicians for every engineer. This partly reflects the fact that nearly a third of all school-leavers go on to higher education in the United States, whereas less than 10 per cent do so in Europe.

Other differences in occupational patterns between the United States and Western Europe appear to be far less significant than this one major difference. Actual production techniques do not appear to differ very greatly, as capital intensity is low in both areas. In both areas, a large proportion of the unskilled and semi-skilled labour force is female, particularly in assembly.

5. Demand and employment projections

Forecasting future demand for electronic products is particularly difficult because of the major uncertainties in relation to military/space development and procurement. The best way to proceed is probably to postulate several alternative assumptions and to illustrate their implications for manpower requirements. Output increases would, of course, be much greater than employment increases, as in the past.

Three alternative assumptions are discussed here:

(A) A continuing slow growth in government military/space electronics expenditures. A year ago, it seemed likely that military/space expenditures would level off in the United States and France or even fall slightly, and they actually have fallen in the United Kingdom. But, as a result of the Vietnam war, United States military expenditures are now rising again. There is also growing pressure in Europe for a more ambitious space programme and for greater independent development of weapons with a higher electronic content. Consequently, a continued growth of military/space electronics must be accepted as a realistic possibility in both the United States and Europe.

(B) A phased reduction of military electronics expenditures over five years as a result of relaxation of tension and limited disarmament agreements; continued growth of space electronics. This must also be accepted as a realistic possibility once the Vietnam war is terminated.

(C) A much more rapid reduction in military electronics expenditures over one to two years (as in 1945-46). This possibility may seem remote but cannot be completely excluded. As it is a highly desirable aim of international policy, the possible economic consequences must be considered. It is assumed here that such a rapid reduction would be accompanied by greater expenditures in civil space activities, so that space electronics expenditures would continue to increase (Table 5).

Whereas three alternatives are considered for military/space demand, only one projection is considered for civil electronics. This is based on projections made by McGraw Hill and other market research organisations. It assumes continued growth of GNP in the United States and Western Europe at rates a little slower than those from 1960 to 1965, but takes into account the differing trends of final demand for electronic consumer and capital goods respectively. Demand for civil electronic capital goods is assumed to rise at a very rapid rate, due primarily to the computer "explosion", but also to strong demand for electronic instruments, medical equipment, teaching aids, process control and civil aircraft equipment. Projections of civil demand for electronic products are, of course, subject to the usual errors of economic forecasting.

It is also assumed that the technological revolution in components for both civil and military equipment will continue. Discrete components for electronic equipment will increasingly be replaced by various types of integrated miniaturised circuits. This change is proceeding most rapidly in the aero-space sector, but will affect civil capital goods to a very considerable extent in the next five years. One of the main effects on component firms will be to strengthen the position of those firms which are technological leaders and have relatively strong development and design teams. It may also reduce competitive imports from the Far East for a short period.

Table 5

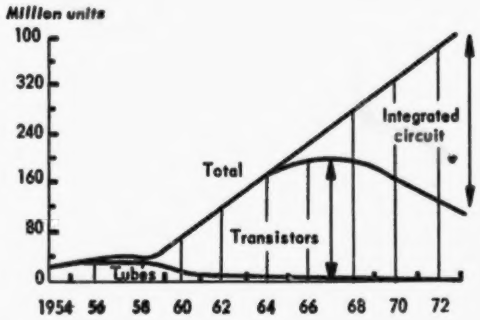
Illustrative projections of electronics employment by principal sectors, 1965-1970

Compound annual % rates of change

	United States	"West Europe" (UK and EEC)
Assumption (A)		
Civil (consumer)	+ 3	+ 5
Civil (capital)	+ 5	+10
Military/space	+ 4	+ 4
Total electronics	+ 4	+ 6
Assumption (B)		
Civil (consumer)	+ 3	+ 5
Civil (capital)	+ 5	+10
Military/space	- 6	- 6
Total electronics	- 1	+ 4
Assumption (C)		
Civil (consumer)	+ 3	+ 5
Civil (capital)	+ 5	+10
Military/space	-30	-35
Total electronics	-18	- 2

Table 6

United States industrial active element groups



Source: "Sprague Electric", Paper No.TP-64-9.

6. Implications of alternative projections for aggregate manpower requirements

It is evident from Table 5 that on "Assumption (A)" the main overall problem would be one of continuing manpower shortages in all sectors of the industry. These would be more acute in Europe and most acute in the civil capital goods sector. A persistent shortage of engineers and mathematicians would be highly probable, not only because of the growth of the industry, but also because of a steady trend towards the American pattern of engineer employment. This would tend to happen partly because of fashion and partly because of the activities of American firms in Europe, but mainly because of the effects of technological competition. Product innovation and the need for shorter lead-times are both likely to strengthen the demand for engineers. Since the main growth sector will be capital goods, there will also be shortages of technicians, draughtsmen, and various types of skilled craftsmen, especially fitters and assemblers.

Even on "Assumption (B)" (a steady annual reduction in military electronics expenditure over a five-year period), aggregate employment in the European electronics industry would continue to increase at a rate much faster than the general average for the manufacturing industry. Furthermore, the rapid expansion of civil production of electronic capital goods would create favourable circumstances for the absorption of personnel made redundant by the run-down in military programmes. Even in the United States, where the weight of military programmes in the electronics industry is far greater than in Europe, the fall in total employment in the industry on "Assumption (B)" would be only of the order of 1 per cent. Normal wastage is far greater than this, so that it is unlikely that there would be a serious problem of unemployment.

However, both in the United States and in Europe there might well be specific local or regional problems of redeployment of manpower following the termination of specific military programmes. In Europe, it is unlikely that these would be serious. For example, in the United Kingdom, the termination of one of the largest military projects with a high electronics content (the TSR 2) did not create any serious long-term employment problems. Individual firms experienced temporary difficulties, but redeployment of the redundant manpower was greatly facilitated by the fact that many of the firms involved on the electronics side were multi-product firms. Since they had expanding activities in other electronic capital goods and in consumer electronic products, this facilitated the redeployment of the personnel affected.

In the United States, because of the concentration of military contracts in certain States (Table 7) and because of the far greater scale of defence development and procurement, the regional redundancy problems would be more serious. However, the continuing expansion of civil electronics production and particularly of capital goods would greatly facilitate re-adjustment. Here again, the fact that the leading electronic firms with large defence contracts are also major suppliers of the civil market would greatly assist redeployment (for example, Radio Corporation of America, International Business Machines, International Telephone and Telegraph, General Electric, Westinghouse, Sperry Rand, Honeywell, Texas Instruments, Hewlett Packard, etc.).

Only on "Assumption (C)" would there arise a major national (as opposed to regional) problem of unemployed resources in this industry, and here only in the United States. In Europe, the small scale of military electronics and the rapid expansion of the civil market would make the problem one relatively easy to manage. In the Federal Republic of Germany, Italy, Belgium, Luxembourg and the Netherlands there should be no major problems of redeployment. There would be difficulties in Britain and France, but these would be transitory and short-term, since in both these countries there are serious and persistent shortages of professional and skilled manpower. A fall of 2 per cent per annum in total employment in the industry would not cause grave difficulties in an expanding economy.

It may, however, be objected that, on the assumptions postulated, controlled disarmament might be having a depressing effect on the economy as a whole. More serious unemployment would occur in the aircraft industry and the ordnance industry than in electronics. Consequently, other employment opportunities would be scarcer and the whole problem of redundancy much more serious. This is a valid objection. The corollary of controlled disarmament in the political field would have to be Keynesian expansionist policies for the economy deliberately designed to offset the deflationary effects of the sharp fall in military demand. These effects would be very serious on "Assumption (C)", but not on "Assumption (B)" unless reduction in military demand coincided with a cyclical downturn. In the present state of both the American and European economies, reductions in military demand on the scale of "Assumption (B)" provide a welcome relief from inflationary pressures.

For "Assumption (C)", the experience of redeployment after World War II is encouraging. The resilience of the American and of the European economies made it possible for the civil sector to absorb redundant military resources on a far greater scale than any envisaged here. However, it would be desirable to avoid the relatively small-scale unemployment which occurred in 1946 and, in any case, circumstances are different because of the scale of war-time destruction to be made good in 1946. It would, therefore, be desirable for contingency planning to be undertaken in advance, to meet the situation likely to occur as a result of fairly rapid controlled disarmament. So far as the electronics industry is concerned, there would be a need for major conversion programmes in Britain and France.

Some work on these problems has already been done, both by Government and by private agencies - for example, the studies of the United States Arms Control and Disarmament Agency (1), of the United Nations Economic and Social Council (2), and of the Economist Intelligence Unit (3). Among the most useful suggestions are the proposals to deal with specific industries by special programmes, in addition to overall economic measures of a Keynesian type. The effects of disarmament would, in fact, be largely concentrated in a few industries, and policy must be sufficiently flexible to deal with their specific problems. The most important of these industries are the ones which are the subject of this OECD Seminar - the aircraft industry and (to a lesser extent) the electronics industry. The effectiveness of specific industry programmes would depend to some extent on the possibilities of substitution by sectors within the industry. The final section of this paper, therefore, discusses these possibilities and their implications for education and training programmes.

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(1) "The Implications of Reduced Defense Demand for the Electronics Industry", United States Arms Control & Disarmament Agency, Washington, September 1965.

(2) U.N.: "Economic & Social Consequences of Disarmament", New York, 1962.

(3) "Electronic Industries Year Book", 1965, Electronic Industries Association, Washington.

Table 7

Distribution of employment in military-space and industrial-commercial electronics manufacturing, by region and state (USA), January 1961

Region and State	Employment	
	Number	Per cent
Pacific	89,856	30.6
California	88,858	30.3
Other	998	0.3
Middle Atlantic	80,349	27.4
New York	36,472	12.4
New Jersey	28,286	9.6
Pennsylvania	15,591	5.3
East North Central	34,153	11.6
Illinois	13,588	4.6
Wisconsin	10,730	3.7
Ohio	4,763	1.6
Indiana	4,205	1.4
Other	867	0.3
South Atlantic	30,713	10.5
North Carolina	13,552	4.6
Maryland	9,166	3.1
Florida	6,617	2.3
Other	1,378	0.5
New England	24,998	8.5
Massachusetts	16,428	5.6
Connecticut	3,395	1.2
Other	5,175	1.8
West North Central	15,181	5.2
Iowa	9,376	3.2
Minnesota	4,541	1.5
Other	1,264	0.4
West South Central	14,367	4.9
Texas	14,130	4.8
Other	237	0.1
East South Central	3,166	1.1
Tennessee	3,093	1.1
Other	73	neg.
Mountain	414	0.1
Arizona	70	neg.
Other	344	0.1
TOTAL	293,197	100.0

Source: "Electronic Industries Year Book 1965", E.I.A., Washington, p.64.

7. Implications for special adjustment programmes, training and education

On Assumptions (B) and (C) there would be big problems of redeployment within the electronics industry, while on Assumption (A) there would be big problems of recruitment and training. In either case, there is obviously a need for the maximum degree of flexibility. Many of the techniques developed in military-space electronics can be (and are being) applied in the civil sector (Table 8). There are reasons for believing that a greater movement of people between the sectors would, in fact, be highly beneficial for the civil economy.

However, experience has shown that companies, departments, working teams, and individuals who have been accustomed to the military-space sector for a long time, find considerable difficulty in adjusting to the somewhat different needs of the civil sector. As has already been noted, the performance standards, component needs, design, cost considerations, marketing organisation, and advertising may all differ very extensively. Consequently, a re-adjustment programme will involve:

(i) Well-planned training arrangements on the part of public and private organisations in the industry;

(ii) Full consultation between management and unions over training and redeployment;

(iii) On Assumption (C), governmental transitional assistance in the form of training grants, civil development and procurement contracts, and investment incentives. (This could also apply locally on Assumption (B) where major dislocation occurs).

It is evident that the continued growth of the industry and the smooth re-adjustment to disarmament (when and if it occurs) will be facilitated by the contribution of the national educational system. Adaptability is related to educational background. A succession of specialised skills may be acquired during a lifetime, if this is broad and strong. Consequently, the rapid process of technological change in the electronics industry points to a two-fold educational need:

(i) Continued expansion of the whole system of general education and avoidance of too-early specialisation within the system.

(ii) Widespread, flexible arrangements within industry, as well as in the public sector, for thorough specialised training in accordance with the rapidly changing requirements of industry.

Neither of these elements can be sacrificed if we are to face the technical and economic uncertainties of the 1970's. Economic prediction may become more accurate. Political stability may become more assured through disarmament. But, technical change will, by definition, continue to be in part unpredictable. Consequently, the educational and training system must systematically prepare people for the continuous acceptance of change in our occupations, as a normal aspect of life.

Table 8

Transferability of systems or electronics functions

Functions	Technological leader	Uniqueness to DOD	Transferability by company or individual	Examples of transferability	Factors transferable	Special requirements
Command & control	Defense leading, but other industry can benefit	Not unique	Company - requires team of individuals acquainted with various aspects of problem	Information handling and control of large company operations	Method of looking at problem - equipment for performing (computer display)	Study of individual situation & fitting to specific need
Guidance and control	Defense & other government lead; industry follows in several years	Reasonably unique	Company	Military target drones lead to automatic landing systems for commercial aircraft	Systems approach, technology and knowledge of sophisticated systems	Publically acceptable systems where humans concerned; lower cost with same or better reliability
Surveillance & detection	Defense leads; industry uses follow with few years lag	Reasonably unique	Company	Ground-based, airborne, shipborne radar (security systems), harbor control, weather prediction, smoke detection etc.	Technology of defense systems	Less expensive special-purpose systems
Communications	Industry generally	Not unique	Company - compatible equipment needs are foremost; Individual - technology needed in many industries	Mobile radio, mobile telephones, private microwave systems for railroads	All factors (knowledge, equipment, mfg. methods service)	Study of needs of company and good marketing
Feedback & process control	Industry leading & providing own R & D funds	Not unique; needed by most industries	Company & individual can study problems & define needs	Chemical processing, oil refineries, glass melting tanks	Systems approach - transducers & sensors - computers, display	Detailed understanding of technology of industry to which applied

(Continued)

Functions	Technological leader	Uniqueness to DOD	Transferability by company or individual	Examples of transferability	Factors transferable	Special requirements
Navigation	Defense, because of missile & satellite work	Not unique	Company - requires system approach	Loran	Advanced technology, precision	
Automatic check-out & quality control	Defense, particularly missile & weapon-system check-out	Not unique, but much more sophisticated	Individual - methodology; Company - methodology & equipment	Automated production lines	Methodology, some equipment	Detailed study of other industries needs
Telemetry	Defense & other government, NASA missiles rocket probes	Not unique	Company & individuals	Control of gas & electric power transmission & distribution, control of offshore-oil production	Methods & equipment to perform - sensors, coding processing, storing information	Finding & analysing promising application
Instruments	In most areas defense & other government because of demand for reliability	Not unique	Company & individuals	Numerous - electronic logic to fluid logic	All	Study of various industries to determine needs
Data processing	Industry	Not unique	Company & individuals	Numerous - business machines scientific computers	Techniques & equipment	Lower cost equipment, more versatile, input-output equipment
Entertainment (TV, radio, phono)	Industry	Not unique	Company	Industrial intercommunication	Manufacturing to a cost-conscious market	Large volume market

Source: U.S. Arms Control & Disarmament Agency: "The Implications of Reduced Defense Demand for the Electronics Industry", pp. 48-49.

L I S T   O F   P A R T I C I P A N T S

BELGIUM

DECOSTER F.

Secrétaire national de la Centrale des métallurgistes de Belgique, F.G.T.B.,

National Secretary of the Metalworkers'Centre, F.G.T.B.,

17, rue Jacques-Jordaens, Bruxelles 5.

Rapporteur

GRANDJEAN Albert

Attaché au Service d'études de la Centrale chrétienne des métallurgistes de Belgique, C.S.C.B.,

Attaché, Research Department, Christian Metalworkers' Union, C.S.C.B.,

44, avenue de l'Eté, Waterloo.

JAVAUX René

Secrétaire général de la Centrale chrétienne des métallurgistes de Belgique, C.S.C.B.,

General Secretary, Christian Metalworkers' Union, C.S.C.B.,

9, rue du Panorama, Wemmel.

Rapporteur

van PEBORGH R.

Membre du Service d'études de la Fédération générale du travail de Belgique (F.G.T.B.),

Research Department, General Federation of Labour (F.G.T.B.),

42, rue Haute, Bruxelles.

SPIT Ferrie

Secrétaire général de la Fédération internationale des Syndicats chrétiens de la métallurgie,

General Secretary, International Federation of Christian Metalworkers' Unions,

23, rue Julien-Hanssens, Bruxelles 2.

Co-Chairman

WALDACK Willy

Secrétaire national de la Centrale générale des Syndicats libéraux de Belgique (C.G.S.L.B.),

National Secretary, General Federation of Belgian Liberal Unions (C.G.S.L.B.).
De Pintelaan,
223, Gand.

FRANCE

BLANC Jean

Délégué général du Syndicat des cadres de l'aéronautique, C.G.C.,

General Representative of the Union of Supervisors for Aircraft Industry, C.G.C.,

14, rue du Bourdonnais, Asnières, 92.

BOUTAUD F.

Fédération de la métallurgie, C.G.T. - F.O.,

Directeur du Centre intersyndical d'études et de recherches de productivité (C.I.E.R.P.),

Metalworkers' Federation, C.G.T. - F.O.,

Director of the C.I.E.R.P.,

8, rue du Hanovre, Paris, 8ème

Rapporteur

CALIOT Jean

Fédération générale de la métallurgie, C.F.D.T.,

Membre du Bureau de la branche aérospatiale,

General Metalworkers' Federation, C.F.D.T.,

Member of Aerospace Department,

Le Béguinage, No. 52, Beyris, Bayonne, 64.

CHARRIAUD Monique

Chargée d'études au Bureau d'études économiques de la Confédération générale des cadres (C.G.C.),

Research Officer, Economic Department of General Federation of Supervisors (C.G.C.),

30, rue de Gramont, Paris 2ème.

COLAS René

Président du Syndicat national des cadres de l'industrie electronique, C.G.C.,

Chairman of the National Union of Supervisors for the **Electronics Industry**, C.G.C.,

41, avenue Sainte-Foy, Neuilly, 92.

COTTAVE Robert

Secrétaire général adjoint de la Fédération des ingénieurs et cadres, C.G.T. - F.O.,

Deputy General Secretary, Engineers and Supervisory Staff Federation, C.G.T. - F.O.,

198, avenue du Maine, Paris 14ème.

Rapporteur.

DUMAS Roger

Fédération générale de la métallurgie, C.F.D.T.,

Membre du Bureau de la branche aérospatiale,

General Metalworkers' Federation, C.F.D.T.,

Member of Aerospace Department,

10, rue J. Oudot, Melun, 77.

DURAND Michelle

Centre de recherches, Institut des sciences sociales du travail,

Research Centre, Institut des Sciences Sociales du Travail,

27, rue de Fleurus, Paris 7ème.

EUDE Henri

Secrétaire du Syndicat Nord-Aviation/Chatillon, C.G.T. - F.O.,

Secretary of Nord-Aviation/Chatillon Union, C.G.T. - F.O.,

131, avenue de la République, Les Mureaux, 78.

FAUCONNET Roger

Membre du Bureau fédéral de la Fédération de la Métallurgie, C.G.T. - F.O.,

Member of Federal Bureau of Metalworkers' Federation, C.G.T. - F.O.,

73, rue de l'Argonne, Orléans, 45.

GRANOUILLAC André

Directeur du Bureau d'études économiques et sociales, C.G.T. - F.O.,

Head of the Economic and Social Studies Bureau, C.G.T. - F.O.,

198, avenue du Maine, Paris 14ème.

Rapporteur final

GUILLAUME Patrice

Secrétaire fédéral de la Fédération des cadres de la métallurgie, C.G.C.,

National Secretary of Union of Supervisors for Metal Industry, C.G.C.,

5, rue La Bruyère, Paris 9ème.

LAROUSSINIE Gilbert

Fédération générale de la métallurgie, C.F.D.T.,

Metalworkers Federation, C.F.D.T.,

C.I.E.R.P.,

8, rue du Hanovre, Paris 8ème.

Rapporteur

MARTIN Charles

Secrétaire du Syndicat national des cadres de la métallurgie, C.G.T. - F.O.,

Secretary, National Supervisory Staffs Federation for Metalworkers, C.G.T. - F.O.,

7, rue Georges-Vogt, Meudon, 92.

MONTANE André

Secrétaire du Syndicat de Sud-Aviation, C.G.T. - F.O.,

Secretary of Sud-Aviation Union, C.G.T. - F.O.,

Cité Bourrdssol, Bat.18, App.76, Toulouse, 31.

SAKIROFF Marcel

Fédération générale de la métallurgie, C.F.D.T.,
Membre du Bureau de la branche aérospatiale
General Metalworkers'Federation, C.F.D.T.,
Member of Aerospace Department
35, Cité Saint-Georges, 96, Route d'Espagne, Toulouse, 31.

ZILLIOX Louis

Secrétaire fédéral, Fédération de la métallurgie, C.F.D.T.,
Federal Secretary, Metalworkers' Federation, F.C.D.T.,
10, Le Rouillon, Balizy par Longjumeau, 91

NETHERLANDS

van de BOGAARD A.C.A.

Catholic Union of Workers in the Metal and Electrotechnical Industries, N.K.V.,
Maliebaan 2, Utrecht.

BRUGGINK A.J.

Protestant Union for the Metal and Electrotechnical Industries, C.N.V.
Nijenoord, 2, Utrecht.

Van VELTHOVEN H.J.M.

Economic Adviser, Catholic Union of Workers in the Metal and Electrotechnical Industry "St.Eloy", N.K.V.,
Maliebaan, 34, Utrecht.
Rapporteur

VOS P.J.

Economic Adviser, General Netherlands Union for Metalworkers, N.V.V.,
Andries Bickerweg, 6, La Haye.
Rapporteur

WAMSTEKER W.A.

General Netherlands Union for the Metal and Electronics Industries, N.V.V.,
Andries Bickerweg, 6, La Haye.

UNITED KINGDOM

BREAKELL T.A.

Executive Councillor, Electrical Trades Union, T.U.C.,

196, Deepdale Road, Preston, Lancashire.

Rapporteur

BUCK Leslie

General Secretary, National Union of Sheet Metal Workers and Coppersmiths,

Confederation of Shipbuilding and Engineering Unions (CSEU), T.U.C.,

178, Meadvale Road, Ealing, London, W.5.

CHAPMAN Henry

General Secretary of the Clerical and Administrative Workers' Union,

Member of the Executive Council of the C.S.E.U., T.U.C.,

31, Pentlands Close, Mitcham, Surrey.

DOUGHTY George

General Secretary of the Draughtsmen's and Allied Technicians' Association,

Member of the C.S.E.U., T.U.C.,

Onslow Hall, Little Green, Richmond, Surrey.

FREEMAN Christopher

Director, Unit for the Study of Science Policy, University of Sussex,

Falmer, Brighton, Sussex.

Rapporteur

GREEN Leonard

General Secretary of Heating and Domestic Engineers' Union,

Member of the Executive Council of the C.S.E.U., T.U.C.,

917, Warwick Road, Solihull, Warwickshire.

LEWIS Dan

Member of the Executive Committee of the Amalgamated Engineering Union, T.U.C.,

110, Peckham Road, London, S.E.15.

Co-Chairman

McCUSKER Robert

Assistant General Secretary of the Association of Supervisory Staffs, Executives and Technicians, A.S.S.E.T., T.U.C.,

24, Croftdown Road, London, N.W.5.

ROBERTS Alfred

General Secretary of the National Union of Vehicle Builders,

President of the C.S.E.U., T.U.C.,

31, Hassop Road, North Reddish, Stockport, Cheshire.

SCANLON H .

Executive Councilman,

Amalgamated Engineering Union, A.E.U., T.U.C.,

110, Peckham Road, London, S.E.15.

Rapporteur

VESEY HOLT O.J.

Senior Lecturer in Industrial Marketing, Northampton College of Advanced Technology,

St. John Street, London, E.C.1.

Rapporteur

INTERNATIONAL ORGANISATIONS

International Labour Office (I.L.O.)

Geneva, Switzerland

BERGMANN R.

Chief of the Automation Unit, Research and Planning Department,

Trade Union Advisory Committee to the OECD (T.U.A.C.)

FORD Charles

Deputy Secretary

42, rue Galilée, Paris 16ème.

VARAGNE Georges

Deputy Secretary,

5, rue Mayran, Paris 9ème.

European Economic Community (E.E.C.)
23, avenue de la Joyeuse Entrée, Bruxelles, Belgique.

VAN PRAAG Philip
Principal Administrator, General Directorate for Social Affairs.

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT - OECD

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United States Delegation to OECD

STEWART Charles D
Labor and Manpower Adviser,
2, rue de la Faisanderie, Paris 16ème.

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INTERNATIONAL SEMINARS 1966-3

geographical and occupational mobility of workers in the aircraft and electronics industries

REGIONAL TRADE UNION SEMINAR

Paris, 21st-22nd September, 1966

SUPPLEMENT TO THE FINAL REPORT

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FOREWORD

Regional seminars have as their purpose a more detailed appraisal of issues which have previously been considered in international seminars. In 1963 an international joint seminar was held on the general subject of "geographical and occupational mobility of manpower"(1). It reviewed the problems rather broadly and the case studies covered very varied conditions. The present seminar focused on a more limited area where change is both continuous and abrupt. The major issues before this meeting were, first, the measures necessary for an adequate solution to the problems confronting employees and, second, specific measures and methods to ensure the desired level of employee adjustment to change.

The most outstanding conclusion to be drawn from these discussions is that any consideration of change will immediately bring to mind questions of broad economic and political policy. A second conclusion is that the degree of special treatment necessary in such a highly volatile situation will depend upon each specific setting. The impact of innovation in the electronics sector had to be viewed in the light of the great diversification of production in the broader industry of which the aircraft sections were but a part. On the other hand, the changes in the aircraft industry were distinctive, separate and far-reaching in scope and on each occasion had to be regarded as involving thousands of employees. Programmes for them had to be specially developed as part of the administrative procedures of the specific enterprise and the national manpower policy.

Enterprise personnel and industrial relations policies have a critical impact on the labour market. They must therefore be taken into full and careful consideration when formulating programmes and measures for an active manpower policy.

This Supplement contains the papers presented at the seminar by trade union leaders describing the situation in their respective countries in the aircraft industry or the electronics sector working for the aircraft industry. These reports provided the material for the debates during which the issues were crystallized.

In view of the great importance of the United States aircraft industry and its advanced technical position, supplementary material was prepared by the Secretariat and presented to the participants. This concerned the programmes and problems in that country from the standpoint of the trade unions, government investigators and management. As the solutions urged by trade unions in the United States were markedly different from those in Europe, an opportunity was afforded of studying a broader range of alternatives. These supplementary documents are also included in The Supplement. Finally, the general rapporteur, Robert Cottave, presented a paper on the "Role and Attitude of Trade Unions".

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(1) Report 213 pp.; Supplement 109 pp., O.E.C.D., Paris.

The final report of this Seminar consists of a summary of the papers and the discussion prepared by André Granouillac; a discussion of major issues by Solomon Barkin; and the two introductory papers on the aircraft industry by O. Vesey Holt and the aircraft sector of the electronics industry by Christopher Freeman.

A list of the international seminars is added to this volume to permit the reader to review all the subjects covered in previous seminars.

Solomon Barkin
Deputy to Director, Manpower and Social
Affairs Directorate and Head of Social
Affairs Division.

INTRODUCTORY STATEMENT AND QUESTIONS

by Solomon Barkin

The Member countries of the O.E.C.D. have subscribed to the principles of an "Active Manpower Policy". Its underlying concept is that each country should develop a system of national policies designed to achieve the fullest productive employment of the human resources in a free society. It is not limited solely, as previous programmes have been, to the provision of employment *per se*. It underscores the desirability of realizing the optimum productive application of human resources. It encompasses all groups of people and employers. It calls for policies and programmes appropriate for meeting the constantly changing needs of a dynamic society. It emphasises the need for unending adaptation and protection of the human resources in the course of economic change. The objectives of an active manpower policy are to contribute to the attainment of the national defined rate of growth, stability and rising living standards.

The realization of an active manpower policy depends upon people having a clear view of its goals and purposes, a determination to secure its application, the presence of organisations for its implementation, a set of policies adapted to a consummation of these ends and the financial, organisational and human resources for their attainment. Fortunately, the decision in the post-war years to press for full employment and specifically defined targets of economic growth have facilitated the introduction and acceptance of these views respecting manpower policy. No longer need the advocacy of these programmes be based solely on considerations of basic humanitarianism and social justice, which however justified are not easily accepted by the financial and economically oriented interests. Progress toward the established economic goals in these societies, it is recognised, now depends on the application of these new views on manpower policy. Deficient recruitment, competence and allocation as well as opposition from the active population can inhibit as well as stifle economic progress.

Confronted by problems of labour scarcity, as well as pockets of unemployment and underemployment, the industrially advanced countries are seeking new manpower policies. These new perspectives demand that the nations define precisely which groups may be considered as potential new sources of manpower. Which of the marginal or hard-to-place groups are to be assisted in becoming regular members of the work force? Are women with family responsibilities to be encouraged to enter the labour force?

Optimum economic growth depends substantially upon having an appropriately qualified labour force. Therefore a pressing issue is what inadequacies are there in the system of educational and vocational preparation of the work force which have to be overcome to facilitate the attainment of economic goals? Underemployed as well as unemployed human resources represent a waste which is no longer acceptable in this new era. Therefore an active manpower policy calls for the stimulation of demand or the organisation of job creation programmes to provide employment opportunities and assure productive jobs and economic expansion at times and in places where slackness appears. The programme now envisages the identification of areas of underemployment and unemployment of human resources so that the appropriate positive steps may be taken.

The labour market organisation usually identified with the Employment Service must be adequately and skilfully equipped with the appropriate resources to assist in the reallocation of the work force to achieve these economic goals and to assist in the raising of the living standards of the population. The manpower agencies are conceived as taking the initiatives to promote mobility where necessary and guard against any wasteful movement and excessive labour turnover. Finally, such a programme assures the protection and assistance in adjustment to changes which will expedite the process of economic and technological innovation and limit the harmful and depressing effects which mobility itself may have on members of the work force or their dependants.

An active manpower policy cannot be viewed simply as a programme to be initiated, administered by and solely applicable to government or public agencies. It defines national objectives to be promoted through both public and enterprise policies and activities. Both should be co-ordinated and complement one another. Therefore co-ordinating agencies are necessary for governmental activities and between the government and the enterprise or industrial policies and programmes.

The Manpower and Social Affairs Committee has sponsored a number of studies for the detailed refinement and elaboration of these approaches. Seminars have been held to explore these issues with management and trade unions. A seminar in November 1963 in Castelfusano focused on the general techniques of geographical and occupational mobility and their role in an active manpower programme. It built upon case studies and the experience of the partners in industry. Other seminars have been held on other aspects of manpower policy.

The present seminar is being held at the instance of the Trade Union Advisory Committee. It seeks to examine the problems of developing an active manpower policy in relation to workers employed in an industry undergoing rapid economic and technical changes. The two industries under discussion, the aircraft and aircraft branch of the electronics industry, are conspicuous in experiencing vast changes at a rate which is one of the highest now prevalent.

The major challenge before this seminar is to help define the implications of these rapid changes for manpower policy. There is a need to spell out the nature and scope of these changes, their rate of application and penetration. What effect have they on the size, location and organisation of the industry? What is happening to the level of employment and occupational requirements, job profiles and actual location of jobs? What industrial measures can be employed to stabilise employment as to numbers, people and location? What degree of stability can be expected to be achieved and for which groups within the work population?

For those for whom such stability cannot be attained, what programmes of adjustment should be contemplated? Should they be intra-plant or intra-company oriented? Should they be conceived on a local, regional or national basis? Should they be part of a total programme for all employees or particularly applicable to this group? Since so much of the work is for the government or benefits from government subsidies, should these employees be accorded the same type of protection as regular government employees? Should the contract awards by the government provide funds for the implementation of these protective adjustment programmes for employees? How should these programmes be negotiated? In accordance with the existing industrial relations machinery, or should specific systems be devised for negotiations on a national basis directly with the government? Should the aircraft branch of the electronics industry be included in this group? Should special task forces be available to aid in the adjustment programme whenever sudden large-scale shifts are effected?

These are only a few of the questions which you have to consider in your reflections on the papers which you will hear and debate. After these discussions, we are hopeful that you will consider the broader implications. You have a specialised and highly personal interest in the people in these industries. You represent them in collective bargaining. The national trade union centres and we in the Manpower and Social Affairs Committee and Directorate have another interest as well. We are anxious to derive from this case study of an industry experiencing high rates of economic and technical changes, additional insights and keener judgments about the types of policies, institutions and resources needed to maintain a highly adaptable work force maintaining confidence in a progressive industrial society.

One test of the policies and programmes is to be found in their applicability in the more extreme and trying situations. This is provided in the aircraft and aircraft branch of the electronics industry. The issue is whether we can focus exclusively upon promoting basic stability in the industry and existing jobs or must rely upon adjustment mechanisms to help people cushion the effects of the highly advanced rate of change. What type of programme and series of services and aids are most appropriate for the purpose and what type of representation machinery is required to assure their timely and appropriate implementation? To what extent should these programmes be specifically designed for this group of workers, or for them through a broad programme for employees in governmental service or governmentally financed services, or should they be covered by plans embracing the total labour market?

SPECIFIC QUESTIONS

1. What are the main threats to continuous, stable employment for aircraft employees?
    - (a) Dependence on governmental military policy?
    - (b) Dependence on governmental civilian aircraft policy?
    - (c) Intensive international competition?
    - (d) Rapid technological change in production methods, business organisation, or types of craft?
    - (e) Geographical location?
    - (f) Enterprise turnover?
    - (g) Dependence on exports?
2. Are threats to continuous stable employment greater for employees in the aircraft industry than for the aircraft branch of the electronics industry?
3. What techniques have been employed by enterprises in the aircraft industry to even out the volume of work?
    - (a) Sub-contracting of parts of contract?
    - (b) Limiting size of contract?
    - (c) Obtaining sub-contracts for idle capacity?
    - (d) Diversification of production; particularly for civilian products?
    - (e) Varying research and development expenditures inversely with level of production?
4. What does the government do in the form of contracts and aids for research development to foster a stable level of activity in an individual enterprise?
5. At which of these levels should stable employment be sought: occupational group, production unit, plant, company, community?
6. Should these special stable employment goals be limited to those working on government contracts?
7. Is employment stability for any longer period of time feasible for a national aircraft industry? How do the following factors affect the answers: rising rate of technological change, costs of research and development, size of production runs or orders, predominance of the United States Market, rising capital investment per employer?
8. Are demands for long lead times in planning realistic for the aircraft industry?
9. Are national preferences, if any, for government orders sound?
10. What are the deterrents and disadvantages to national systems of compensatory hours of work for defence orders given abroad?
11. Is a European-wide or Atlantic area system of co-ordination of the aircraft industry essential to organise national, viable industries? Will this lead to employment stability? What is a likely system of allocation of functions? What can their size be expected to be? Can some units of the aircraft industry be organised on a viable national basis?

12. Is the rise in the proportion of non-manual employees likely to continue? Will a shift back in emphasis to production away from research and development occur and affect this trend?

13. Is the high rate of professional obsolescence likely to continue? Should provision for updating personnel competences be organised and financed by government or industry? What costs, if any, should employers carry?

14. Are the skills required of production workers being changed? In what direction? How should updating be arranged? How much occupational versatility should be sought to allow for occupational transfers?

15. What provision should be made for the training and education of manual workers to be upgraded to non-manual categories?

16. Is the present high rate of employment instability being compensated by higher wage rates, liberal separation allowances or other benefits? Have they been found necessary for recruitment?

17. Have large chronic groups of unemployed been created by displacements from this industry? If not, what are the basic attributes of the labour force assuring their versatility and mobility? Occupational skill, education, age or which factor?

18. What types of adjustment programmes are necessary for employees in this industry which are not found in others in respect of the following and other items: transfers, retraining, temporary lay-offs, geographical relocation, redundancy allowances, redundancy adjustment programmes, early retirement, selection for redundancy?

19. What research and studies should be undertaken in anticipation of redundancy for reconversion of plant facilities? Do such new activities preserve the aircraft industry or primarily provide a stimulus for new industrial employments?

20. Should the aircraft industry employees, in so far as their work is for military purposes or financed by government, have the same benefits as direct government employees on similar work?

21. Should the terms of benefits and protection and aids be defined by national agreements involving the governments and be applicable to all contracts?

22. Should the collective negotiation systems for such benefits be organised differently from present systems?

23. Should special task forces for aiding in adjustment be organised in the case of large-scale changes in work or size of staff?

24. Should special adjustment machinery be organised for these industries or should regular manpower agencies deal with these problems?

25. In your replies what distinctions would you make for the aircraft industry and the aircraft branch of the electronics industry?

AIRCRAFT INDUSTRY

BELGIUM

by F. Decoster,
National Secretary,
Centrale des Métallurgistes
de Belgique, F.G.T.B.

I. THE BELGIAN AIRCRAFT INDUSTRY AND THE ELECTRICAL SECTOR WORKING FOR THIS INDUSTRY

A. GENERAL STRUCTURE

The Belgian aircraft companies were formed after the Government had expressed the wish in 1920 that Belgium should have an aircraft industry.

Activity in this field has built up progressively since that time, and is now principally concerned with airframes, jet engines, landing gears, hydraulic systems and electrical equipment.

(a) Number of firms

There are two big aircraft constructors in Belgium, namely, the S.A. Belge de Constructions Aéronautiques (SABCA) at Haren and Gosselies, and the S.A. Avions Fairey at Gosselies. Other companies in this field are Sabena with their repair and maintenance workshops, the Fabrique Nationale d'Armes de Guerre (F.N.) which manufactures engines, and firms such as M.B.L.E., Bell Telephone and ACEC concerned with the production of electronic equipment for aircraft.

SABCA and Faireys were in existence before the war and had supplied aircraft to the Belgian Air Force but their factories were destroyed in May 1940 and both had to begin again from scratch after 1945.

(b) Production capacity of these two companies

SABCA possess a full range of production equipment. Their precision engineering and machining departments are equipped with the latest machine tools, and they also have a metrology unit. Mechanical assembly is carried out in a purpose-built air-conditioned building with a dust-proof floor covering. The plant covers a total area of 3.5 hectares, of which 1.5 hectares are occupied by the assembly shops. At the company's flight test centre it is possible to prepare a large number of aircraft in a short space of time.

FAIREYS are engaged in particular in the final assembly of aircraft and repair and maintenance work. They have 10,000 square metres of workshop floorspace and two hangars, each of 3,000 square metres. There is also a special workshop for aircraft instruments and systems. Hydraulic and electrical equipment can be repaired and reconditioned on the spot.

(c) Type of activity

In the immediate postwar period from 1946 to 1950, activities were confined to repair and maintenance work on military aircraft although, as a temporary measure, they also manufactured other products in order to retain their management and skilled workers.

SABCA in particular produced milling machines of various types under licence from

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Switzerland, and entered into an agreement whereby they assembled different types of motor vehicles.

In 1950 the Fairey and F.N. at Herstal received an order for 67 Meteor jet aircraft.

In 1953 the Belgian aircraft industry received an order for 460 Hawker Hunter fighters, to be carried out in collaboration with Fokker and Aviolanda in the Netherlands.

F.N. produced Avon jet engines for the aircraft supplied to Belgium and the Netherlands.

The wings were produced by SABCA and the fuselages by Fairey.

Final assembly of two-thirds of the aircraft for Belgium was undertaken by Fairey, the remaining one-third being assembled by SABCA.

SABCA produced plastic wing-tip jettison tanks under licence in 1956.

Overhaul and repair contracts are an important source of business to the aircraft industry in Belgium. A further impulse came with the order for the F104 G and, being of importance for this paper, this will be analysed later.

B. FUNDAMENTAL CHARACTERISTICS

- The Belgian aircraft industry lacks stability. It depends too much on orders from abroad and especially military orders, and is forced to lay off or discharge a part of its work force at regular intervals.
- Belgium is a small country and there can be no question of a fully fledged national aircraft industry; neither the money nor the design staff are available for Belgium to contemplate the production of new types of aircraft. Moreover, for political and economic reasons it is not possible for her to undertake the complete assembly of military or even civil aircraft - with the exception of training and light aircraft.
- The division of labour at international level is such that Belgium cannot go beyond the assembly or manufacture under licence of certain parts and assemblies.
- Another feature of our aircraft industry is the relative importance of the overhaul and repair side.

C. THE AIRCRAFT INDUSTRY IN RELATION TO THE COUNTRY'S ECONOMY

It may be said at the outset that the aircraft industry ranks low in the economy of the country as regards both numbers employed and output, but it is nevertheless important from the technical standpoint.

The aircraft industry is in the van of scientific progress, especially in regard to electronics, and it employs some of the most highly-skilled people in the country.

(a) Production and exports

Year	Orders booked	Deliveries		Exports	
	(million Belgian francs)	Francs (in millions)	Tons	(million Belgian francs)	Tons
1959	564	576	1,440	219,3	540
1960	1,740	456	36	207,6	12
1961	8,112	432	48	202,8	36
1962	2.352	1,776	360	1,243,2	288
1963	2,172	3,744	660	2,748,0	516
1964	2,160	6,864	624	3,238,8	516
1965	1,384	2,809	224	1,845,0	193

A glance at this table shows the importance of the order for the F.104 G placed in Belgium in 1960.

- Order books have improved from 1960 onwards, rising from 564 million Belgian francs in 1959 to around 1,750 million in 1960 and reaching the record figure of 8,112 million in 1961; between 1962 and 1964 order books remained at a ceiling of around 2,000 million, and the figure of 1,384 million for 1965 reflects the end of the F.104 G contract.
- Examining the figures for deliveries and exports (by value), we find that a very large proportion of the industry's output was for export.

The first big upturn in deliveries and exports came in 1962, when deliveries quadrupled and exports increased by six times (still in terms of value), to reach a peak in 1964 with exports at 3,238.8 million and deliveries at 6,864 million).

(b) Technology

Various new techniques were developed as a result of the F.104 G programme.

As regards Faireys, the investment in men, machines and special equipment for the production of the F.104 G enabled the company to undertake highly-specialised work in a wide variety of fields including in particular:

- Sheet metal work and welding, in light alloys, stainless steels and titanium;
- Glass fibre parts, and rigid foams;
- Wiring looms and precision tooling.

It had the further effect of inducing the company to modernise their laboratories (chemical, mechanical, electrical and pneumatic).

SABCA gained experience from the F.104 G programme in the following fields:

(1) In the production departments

- Production of hydraulic servo-controls, requiring the technical know-how to produce mechanical components with tolerances as close as 0.0001 mm;
- Hydraulic forming of aluminium into shell-nose shapes;
- Heat treatment of special steels, special surface treatments (hard anodising), etc.

(2) In quality control

Experience here has been very considerably increased in the fields of metrology, surface finish inspection, and detection of geometrical errors, using precision measuring instruments and X-ray equipment.

(3) In the electronics field

This programme brought SABCA in touch with the latest techniques in electronics, especially with regard to navigational, fire control and telecommunications systems, and this has prompted the company to open specially equipped departments mainly designed for inspection and testing.

- With regard to engines, the order enabled F.N. to strengthen its industrial and human potential; new techniques that had to be employed covered tooling for the production of compressor and gas turbine blading, a precision forge for the production of compressor and gas turbine blades which is the most powerful of its type in Western Europe, and new test facilities for jet engines with high power ratings.

D. EMPLOYMENT

The trend of employment in the aircraft industry has been as follows:

1959	2,730 workers	1962	2,933 workers
1960	2,684 workers	1963	5,141 workers
1961	1,928 workers	1964	6,140 workers
		1965	4,060 workers

The effects of the F.104 G order began to be felt in 1962 (+ 1,000 workpeople), when the work began to get properly under way. The period of full employment was 1963 (+ 2,208 workpeople) and 1964 (+ 2,000 workpeople), bringing the total to 6,140. The decrease of 2,000 in 1965 shows the order coming to an end.

II. MANPOWER PROBLEMS ARISING WHEN A LARGE ORDER WAS PLACED WITH THE BELGIAN AIRCRAFT INDUSTRY IN 1960

A. SIZE OF THE ORDER

At the plenary meeting of the Conseil professionel du métal (Metal Trades Council)(1) on the 20th June, 1960, the Minister of Defence and the Minister for Economic Affairs spoke about the F.104 G order in answer to a request from the trade unions.

The Minister for National Defence stated that the F.104 G meant that Belgium would be associated with a large-scale manufacturing programme which was expected to come to around 800 aircraft. The orders would come to more than 21 thousand million Belgium francs.

The indirect advantages of this order were also very considerable and, above all, confidential American know-how in the fields of jet engines, electronics and aeronautics in general would become accessible to Belgian industry.

The head of the private office of the Minister for Economic Affairs said that the decision to choose the F.104 G brought Belgian industry into an integrated production project to meet orders from Belgium and the Netherlands for 100 aircraft each, and one from the Germans for 574 aircraft. He added that the total contract would be split up according to the manufacturing potential of each country, and not on any pro rata basis according to the quantities ordered. This meant that Germany would receive orders to a value of around 32 thousand million Belgian francs out of a grand total of between 70 and 72 thousand million while the Belgian and Dutch share would be 21.7 and 17.5 thousand million Belgian francs respectively.

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(1) A joint consultative body whose function is to examine economic problems arising within the metal and metalworking industries and to submit an opinion to the Conseil Central de l'Economie (Central Economic Council), to the ministers concerned or to Parliament.

The Belgian share could be suitably split up among the principal sectors involved; orders worth 5.7 thousand million would be placed for airframes, 8.6 thousand million for engines, and 7.4 thousand million for electronic and ground equipment.

B. THE APPRECIABLE INCREASE IN MANPOWER REQUIREMENTS

The order placed in Belgium for approximately one hundred F.104 G aircraft caused an appreciable increase in the manpower employed in the industry.

Faireys, for example, almost doubled their work force, from 740 to 1,300; the numbers employed at SABCA - Haren rose from 1,600 to 2,250 and there was a much smaller increase at SABCA - Gosselies, from 564 to 780.

In all, the three principal companies in the Belgian aircraft industry increased their work force by some 1,430, and to this figure must be added some 500 taken on by firms which worked on the F.104 G programme without themselves being aircraft companies as such.

C. TRAINING

A percentage of those taken on were already trained, generally through having worked in this industry before.

Training was largely in the hands of firms rather than trade training centres.

The firms took on men and themselves provided the training, either by putting them straight on to the machine under an experienced worker - which was the usual method - or by arranging additional training which usually lasted a few hours a day.

D. PART PLAYED BY THE UNIONS

(a) At national level

Workers' representatives on the Metal Trades Council considered that in view of the large sums of money involved the trade unions should be associated with the financial control on the execution of the orders. Such control could be exercised through a joint committee set up within the Metal Trades Council. Another task for this committee would be to study the indirect effects of the order.

The Unions felt that the Metal Trades Council should deal with two aspects:

(a) financial control; and

(b) co-ordination from the training standpoint.

Unfortunately these suggestions from the unions did not receive full consideration.

(b) At company level

The shop stewards' committees and works councils had a voice in the selection of training methods. The trainees had to learn how to operate new machines rather than be taught new skills. Most of those concerned were turners or milling machine operators and so on with previous experience in their trade but not used to working on the complex and specialised machine tools found in an aircraft factory.

The shop stewards' committees and works councils play an important role where the security of employment is concerned and, as we shall see later, they intervened with some success in the matter of redundancy and compensation.

III. THE END OF THE ORDER AND ITS EFFECTS ON THE NUMBERS EMPLOYED

The end of the F.104 G order brought an upheaval in the employment figures. To illustrate this, let us compare the figures before, during and after the F.104 G order.

	Before	During	After
FAIREYS			
Workpeople	531	926	598
Office staff etc.	208	374	312
Total	739	1,300	910
SABCA-GOSSELIES			
Workpeople	360	490	225
Office staff etc.	204	290	210
Total	564	780	435
SABCA-HAREN			
Workpeople plus office staff etc.	1,600	2,250	1,550
Grand total	2,903	4,330 (1)	2,895

For the F.104 G order, the three companies took on an additional 1,427 persons and, when the order was completed, 1,435 persons left. These figures are interesting in that they show that the additional workers engaged for the F.104 G contract were released once the work was completed.

Let us consider how this reduction was effected.

A. REDUCTION IN NUMBER EMPLOYED

(a) Voluntary departures

These were relatively few in number, being people who knew that they were redundant and had already found another job:

At Faireys: Out of the 328 redundancies, eight left of their own accord.

At SABCA (Gosselies): Out of 215 redundancies, 50 left of their own accord, and of the 700 redundant in the Haren division 35 left voluntarily.

(b) Numbers discharged

These were relatively high, being equivalent to the number of extra people taken on for the order:

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(1) Workers employed at the F.N. engines department must be added to this total which then comes to 5,141 for 1963 and 6,140 for 1964.

At Faireys, 328 workpeople and 62 office staff etc. were discharged.

At SABCA - Gosselies, 215 workpeople and 80 office staff etc. were discharged; it should be noted that at this factory a number of men were subsequently transferred to other firms instead of being discharged.

At SABCA-Haren, 700 workpeople and office staff etc. were discharged.

(c) Transfer of workers to an aircraft company in another country

To our knowledge, the Gosselies division of SABCA was the only factory which arranged transfers; 22 went to military stations in the area, and 20 to Fokkers in the Netherlands.

B. REDEPLOYMENT OF WORKERS

A number of those who were kept on were transferred to other divisions of their company; some went back to their original department and others to an expanding department. No one was to our knowledge sent to another factory within the same firm but at a different location.

The management and the personnel department of SABCA - Haren made numerous approaches, often with success, to the Ministry of Employment and Labour and to the National Employment Office.

C. ATTITUDE AND PART PLAYED BY THE UNIONS

At the industry level, the F.G.T.B. and C.S.C. delegates from the companies affected by the order coming to an end held a number of meetings, which enabled the workers to present a common front when the time came for decisive negotiations.

The C.M.B. and C.C.M.B., too, called meetings of their delegates in order to gather information and so be in a position to make effective approaches to the appropriate authorities (i.e. to the Ministers for Economic Affairs, National Defence, and Employment and Labour).

Finally, workers', employers' and government representatives came together on the Metals Trade Council and jointly considered the situation in the aircraft industry.

However, it was at the level of the firm that the unions were most active.

They had, of course, to accept the economic and technological reasons underlying the redundancies but they took vigorous action to soften the effects.

The results achieved for the redundant personnel varied from one company to another.

FAIREYS

Workpeople:	With less than 2 years in the firm:	14 days' notice without working
	With 2 but less than 3 years in the firm	as above + 63 hours' wages
	With 3 but less than 4½ " " " firm	as above + 126 hours' wages
	With 4½ but less than 6 " " " firm	as above + 189 hours' wages
	With 6 but less than 10 " " " firm	as above + 270 hours' wages
	With 10 but less than 20 " " "	28 days' notice without working + 405 hours' wages
	With 20 years and more	56 days' notice without working + 405 hours' wages

Office staff etc.: Notice as prescribed by law.

SABCA - Gosselies

Workpeople: 750 Belgian francs per year of service, plus end-of-year bonus.

Office staff etc.: Notice as prescribed by law.

SABCA - Haren

Workpeople:

Length of service	Heads of households unmarried over 21	Unmarried under 21
1 year	750 B.F.	600 B.F.
2 years	1,500 B.F.	1,200 B.F.
3 "	2,250 B.F.	1,800 B.F.
4 "	3,000 B.F.	2,400 B.F.
5 "	3,750 B.F.	3,000 B.F.
6 "	4,500 B.F.	3,600 B.F.
7 "	5,250 B.F.	4,200 B.F.
8 "	6,000 B.F.	4,800 B.F.
9 "	6,750 B.F.	5,400 B.F.
10 "	7,500 B.F.	6,000 B.F.

The above allowances were paid as follows:

One third with final wage packet

One third at the end of the first month following final wage packet

One third at the end of the second month following final wage packet

The allowances were stopped if and when the individual returned to work at SABCA, but he retained any allowance already paid to him.

In the event of a worker returning to SABCA after being paid the full allowance, his previous employment in the firm would no longer count for length-of-service purposes.

In the event of a worker returning before the two months had expired and having consequently received only a percentage of the full allowance, only the corresponding percentage of his previous employment would be disallowed for length-of-service purposes.

The economic and social atmosphere in the firm was such that some men left before receiving their notice; they then received their end-of-year bonus even though not entitled to it under the agreement.

Office staff etc.: Notice as prescribed by law.

But during the period of notice the firm made up the salary of staff who found other employment.
(e.g. if an employee who was entitled to six months' notice and had been earning B.F. 12,000 per month at SABCA, found a position at B.F. 10,000 per month SABCA would pay him a monthly allowance of B.F. 2,000 for six months).

F.N. - LIEGE

Workpeople:

Length of Service	Heads of households unmarried over 21	Unmarried under 21
1 year	1,000 B.F.	750 B.F.
2 years	2,000 B.F.	1,500 B.F.
3 "	3,000 B.F.	2,500 B.F.
4 "	4,000 B.F.	3.000 B.F.
5 "	5,000 B.F.	3,750 B.F.
6 "	6,000 B.F.	4,500 B.F.
7 "	7,000 B.F.	5,250 B.F.
8 "	8,000 B.F.	6,000 B.F.
9 "	9,000 B.F.	6,750 B.F.
10 "	10,000 B.F.	7,500 B.F.

20 per cent was paid on leaving, and 20 per cent per month over four months.

IV. HOW TO ACHIEVE GREATER STABILITY AS REGARDS LEVEL OF ACTIVITY AND EMPLOYMENT IN THE AIRCRAFT INDUSTRY

The Belgian aircraft industry has not yet succeeded in achieving a sufficiently stable level of activity. It still experiences periods of very intense activity alternating with serious recessions involving large-scale redundancy.

The only way of mitigating the undesirable consequences of this situation is to decide upon a number of measures to be put into effect by both the industry itself and the government departments concerned.

In the present circumstances the only possible course is to aim at some degree of diversification. Insofar as the government is concerned, it should firstly take steps designed to encourage expansion in the aircraft field and to regulate such activity possibly by switching orders or parts of orders at international level; and secondly it should lend its support to the industry's own efforts aiming at the diversification of production.

A. ACTION AT THE LEVEL OF THE FIRM

(a) The aircraft companies should continue to develop the relationships established with foreign companies at the time of building military aircraft. Such contacts are fundamental to the Belgian industry's reputation abroad, and often make it easier to obtain further orders.

(b) Companies should persevere with their efforts in the civil aviation field as well as in regard to military aircraft, with the object of participating in international projects. Participation in such projects generally proves well worth while in that it automatically ensures a share in the orders that follow.

(c) Thought should be given to greater co-operation between aircraft companies at European level. Such co-operation, which would in effect result in an industry capable of meeting Europe's requirements in the way of aircraft, should include agreements between the various countries designed to regulate the level of activity in the respective national industries (e.g. by occasionally switching orders or parts of orders from one country to another according to the work load at the companies concerned).

(d) Factories should diversify to a greater or lesser extent. They possess an invaluable asset in that their employees constitute a highly-skilled work force which could be used in other fields.

B. ACTION BY GOVERNMENT DEPARTMENTS

(a) It is imperative that government departments and in particular the Ministry of Defence should draw up a medium and long-term order programme, with requirements suitably spread over a period of time.

There can be no doubt that sufficiently detailed five and ten year programmes would allow the peaks and troughs in the activity of the aircraft industry to some extent to be levelled out.

Moreover, a programme of this kind is essential if really effective co-operation is to be instituted and maintained between aircraft constructors in the different countries of Europe, and it would enable the industry to equip itself and re-organize in anticipation of the orders to come.

All too frequently, orders are placed with the Belgian aircraft industry in a sporadic manner and at the eleventh hour, and they take into account only the budgetary considerations applying at the time. A little flexibility and foresight would go far to cut down the redundancies that are an ugly feature of this industry.

(b) By adopting a suitable method of financing, the Ministry of Defence could perhaps arrange for work under its purchasing programmes to start earlier and to be spread out over a longer period. A system of this kind, which would make no difference to the overall expenditure but merely implies a different timetable of payments, would not only help to overcome the difficulties currently facing the aircraft industry but would also even out the cyclical nature of its activity.

(c) All repair and maintenance work on military aircraft should be placed in the hands of the Belgian aircraft industry.

(d) The government should maintain its policy of requiring compensation in hours of work for Belgian factories whenever a defence order is placed abroad, as has been the practice for some years.

(e) Lastly, substantial government aid should be available to firms in the process of turning over to other products (which saves a great many redundancies). And the government should also promote aerospace research by the aircraft industry.

FRANCE

Programmes for the Conversion of Facilities to new needs for Retraining and for Relocation of Employees,

by F. Boutaud,
Metalworkers Federation,
(CGT Force Ouvriére).

The time allotted for this study was too short for us to make as thorough an investigation as we would have liked. In particular, we were unable to obtain detailed information on the electronics industry working for the aircraft industry or comprehensive statistics concerning the reconversion schemes implemented in the last few years.

We consider, moreover, that the subject as defined in the title "reconversion programmes and retraining and relocation programmes" is not exactly applicable to the situation in France, where the schemes of which we are aware were the result of individual decisions rather than in pursuance of an overall plan.

There is no doubt that this absence of a planned programme would lead to a deterioration in industrial relations if there were to be a serious crisis in the French aeronautics industry. The reconversion and vocational resettlement of highly specialised workers with widely differing qualifications calls for arrangements which cannot be improvised but require thorough and careful consideration.

We are grateful for this opportunity to give expression to our ideas in this context, to learn about the experience of the workers in neighbouring countries, and to compare notes.

In the following pages, we attempt to describe the difficulties encountered in connection with reconversion schemes, together with the legislative provisions in force and their faults and deficiencies. Finally, we offer a tentative definition of the appropriate guide-lines for further research aimed at discovering acceptable solutions in critical situations. This conclusion is in fact a research programme which we consider it essential to implement while the situation remains relatively calm, with a view to facilitating reconversion schemes as they become necessary later on.

The report is supplemented by a description of a few reconversion and relocation schemes by M. LAROUSSINIE

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BASIC DATA ON THE FRENCH AIRCRAFT INDUSTRY

I - NUMBER OF WORKERS BY BRANCHES

Over the last few years, the French aircraft industry has been steadily expanding with a corresponding growth in the number of workers it employs, as shown in the following table:

	1961	1962	1963	1964
Total labour force at end of year:				
Airframes........................	49,000	49,750	51,680	53,785
Aero engines......................	16,650	17,750	18,825	18,835
Accessories.......................	20,200	20,800	20,750	21,425
Total................	85,850	88,300	91,255	94,045

In addition to the above, there are 337,000 workers in the electronics industry engaged on work for the aircraft industry who represent less than 3 per cent of the total labour force in the electrical industries.

The relative size of the aircraft industry is indicated by the fact that the total labour force employed on aircraft construction is about 100,000, out of roughly 7,000,000 wage-earners employed in French industry as a whole as at 1st January, 1964.

This shows the relative smallness of the French aircraft industry, from the point of view of the number of workers it employs, and the relative stability of its labour force. At the same time, this overall view tends to conceal some quite widely differing internal situations, and it would be unwise to conclude that growth in the industry has been along harmonious lines and will proceed unhindered.

While the introduction of new techniques has already led to large-scale vocational reconversion within individual firms, fluctuations in the economic situations are being anxiously watched - particularly as they might affect firms which represent the main activity in some regions. It is therefore appropriate to consider not only the data relating to the country as a whole, but also the distribution of the labour force by regions and grades.

II - REGIONAL BREAKDOWN OF WAGE-EARNERS IN THE AIRCRAFT INDUSTRY

In 1960, the distribution of engineers and supervisory grades, between PARIS and the PROVINCES, was as follows:

AIRFRAMES MANUFACTURING

PARIS, 2,370	PROVINCES, 1,316

AERO-ENGINES

PARIS, 1,149	PROVINCES, 118.

If these figures are related to those for monthly and hourly-paid workers, it is seen that the Paris area comprised:

- 64 per cent of the supervisory grades in the airframes branch,
- 90 per cent of the supervisory grades in the aero-engines branch, corresponding to 71 per cent of the total for supervisory grades,
- 53 per cent of salaried workers (other than supervisors)
- 37 per cent of the hourly-paid workers.

In other words, technical and supervisory staffs are proportionally most highly concentrated in the Paris area.

The following table shows, by regions, the total number of wage-earners employed in the French aircraft industry:

BREAKDOWN BY REGIONS OF THE AIRCRAFT INDUSTRY LABOUR FORCE (including maintenance workers)

	PERSONS EMPLOYED	
	No.	%
1. North	5	0.005
2. Picardy	1,456	1.515
3. Paris area	53,649	55.816
4. Midlands	5,139	5.346
5. Upper Normandy	504	0.524
6. Lower Normandy	-	-
7. Brittany	51	0.053
8. Loire district	5,124	5.330
9. Poitou-Charente	1,687	1.755
10. Limousin	165	0.172
11. Aquitaine	7,943	8.263
12. South-Pyrenees	12,143	12.632
13. Champagne	407	0.423
14. Lorraine	99	0.103
15. Alsace	10	0.010
16. Franche Comté	-	-
17. Burgundy	90	0.094
18. Auvergne	176	0.183
19. Rhône-Alps	1,275	1.326
20. Landuedoc	49	0.051
21. Provence-Côte d'Azur	6,150	6.398
TOTAL..................	96,123	100.000

III - TREND IN THE COMPOSITION OF THE LABOUR FORCE

The slow increase in the number of workers employed has been accompanied by complex structural changes. This results from the increase in the staffs of design and research offices and the changes in manufacturing processes and types of production. The net result is a decrease in the number of hourly-paid workers, at the rate of 2 or 3 per cent per annum, and an increase in the number of technicians and engineers. In the manual workers category, skilled tradesmen accounted for 85 per cent of the total in 1963, as compared with 76 per cent in 1957.

These changes represent both outside personnel movements and, to a large extent, internal promotions or occupational transfers without regrading. These transfers and adjustments required the introduction of special training facilities adapted to their specific aims and using the means available.

In illustration of this, the following table lists the retraining courses sponsored by SUD AVIATION for its workers in the last seven years:

INITIAL TRADE	NEW TRADE	YEAR	NO.	SCHOOL OR TYPE OF COURSE
Joiner	Fitter	1957	14	C.E.T. Levallois
Joiner	Fitter	1960	16	C.E.T Levallois
Miscellaneous worker	Draughtsman	1961	12	In-factory
Miscellaneous worker	Draughtsman	1961	11	In-factory
Fitter	Turner & Miller	1961	7	L.T. Puteaux
Miscellaneous worker	Draughtsman	1961	12	In-factory
Miscellaneous worker	Draughtsman	1962	12	In-factory
Miscellaneous worker	Test worker	1962	11	L.T. Ville d'Avray
Fitter	Turner & Miller	1962	10	In-factory
Miscellaneous worker	Draughtsman	1962	15	In-factory
Joiner	Fitter	1962	14	C.E.T. Levallois
Miscellaneous worker	Test worker	1963	12	L.T.A. Ville d'Avray

C.E.T. = Collège d'Enseignement Technique (Technical Secondary School)
L.T. = Lycée Technique (Technical High School).

Generally speaking, there are three kinds of method employed with a view to occupational adjustments made necessary by technical change, i.e.:

- in-factory training;
- training in a Collège d'Enseignement Technique, leading to the award of a certificate of aptitude;
- training in a Lycée Technique, leading to the award of a technical diploma.

It should also be noted that, simultaneously with these training facilities organised by the firms, many workers and technicians anxious to obtain promotion attend courses of instruction in their spare time.

MEASURES INTRODUCED TO FACILITATE OCCUPATIONAL ADJUSTMENTS AND TRANSFERS

The means which have been employed in recent years have made it possible to meet new technological requirements by adjusting the qualifications of existing workers in a satisfactory manner and at the same time avoiding the need for dismissals. At the same time, however, we should not forget that, during the period considered, overall employment in the aircraft industry has increased as the result of a significant rise in the sector's level of activity. This has been a particularly favourable factor in connection with occupational adjustment, but it would be dangerously unwise to believe that the future will be one of permanent and regular growth. Even if the level of activity remained stable, the level of employment would gradually decline. In such circumstances some factories would have to effect very large personnel cuts, whereas others would be less seriously hit.

Consequently, stagnation of activity - and, a fortiori, a recession - would disturb the balance of employment, with particularly bad consequences for certain factories and far-reaching effects on the economies of the towns where these are located. The means which have thus far been employed for retraining on the spot or organising the unavoidable geographical transfers, would in such circumstances be most inadequate.

It would no longer be enough merely to provide assistance for a limited number of voluntary transfers undertaken by technicians: provision would have to be made for mass transfers affecting all categories of workers. The problem would no longer be expressed in terms of a few dozen or a few score adjustments to be made within a firm, but in terms of finding new employment for several hundreds or even thousands of wage-earners of all kinds. Training, transfers and creation of new jobs are the three instruments at present being employed in a number of regions where some firms have been affected by recessions whose effect multiplies that of technological advance. Would this approach be a suitable one in the case of a crisis in the aircraft industry? To what extent would it provide a solution? These are the questions to which we must endeavour to find an answer.

(a) Measures designed to assist occupational adjustment (The Act dated 18th December, 1963).

These measures comprise the following:

- the possibility of setting up, or helping to set up, "with the assistance and under the control of the Ministry of Labour, temporary training establishments either within the firms concerned or elsewhere".

"This assistance may also be afforded in connection with the organisation of introductory or adjustment courses designed to fit redundant workers for jobs which do not require a complete Adult Vocational Training Course".

- occupational reconversion allowances, which may be granted to wage-earners who are out of work and who are registered with an Employment Exchange, or to workers whose employment contract has not been formally rescinded but who are affected by a mass dismissal programme which has been duly notified to the Ministry of Labour.

These measures are applicable for the duration of the training period, which is not usually more than three months, and are restricted to training given for a trade or qualification corresponding to paid employment in industry or commerce in an occupation where there is a recognised shortage of manpower. The list of such occupations, as drawn up by the Ministry of Labour, is composed almost exclusively of manual jobs, except for a few white-collar jobs, building and public works clerks, and Physics and Chemistry technicians.

(b) Measures designed to assist relocation of workers

The statutory texts setting up the National Employment Fund also make provision for unemployed workers who leave a recognised unemployment area to move to a region where there is a manpower shortage, to be awarded relocation grants, travelling allowances for themselves and their families, and the repayment of removal expenses.

(c) Measures to provide compensation for loss of earnings on down-grading

The Ministry of Labour is empowered to enter into agreements with professional or Union organisations, or with individual firms, providing, inter alia, for workers who are affected by mass dismissals and are unable to be admitted to a retraining course to be granted a degressive temporary allowance enabling them to await a more favourable grading without hardship. In practice, this allowance represents a guarantee that the total resources of those affected will be equal to 90 per cent of their former earnings during the first six months following their down-grading and to 75 per cent during the next six months.

(d) Measures designed to facilitate anticipated retirement

The agreements which the Ministry of Labour is empowered to conclude may provide for a special allowance for workers over 60 years of age who have been affected by mass dismissals and have not been found new jobs. This allowance is paid to them until they become entitled to normal retirement benefit.

(e) Measures intended to encourage the creation of new jobs

Low-interest loans and subsidies may be granted to employers who undertake capital investment expenditure likely to provide new jobs in areas where the employment possibilities are limited. The amount of such loans and subsidies is related to the amount of capital investment undertaken and to the number of new jobs created.

THE EFFECTIVENESS OF THESE MEASURES IN THE AIRCRAFT INDUSTRY

To determine whether these various measures would be effective in the case of a grave crisis affecting the aircraft industry, their incidence on the different occupational groups should be considered.

The most important provisions are those designed to encourage the creation of new jobs. They would probably turn out to be rather disappointing in view of the high degree of specialisation of workers in the aircraft industry. Employers who agree to transfer their activities, or to extend them, in a new area, expect to receive financial incentives and to find personnel willing to work for low wages. As a general rule, they employ a very high proportion of semi-skilled workers, only very few highly-skilled workers, and virtually no technicians or engineers. Moreover, we learn from past experience that many of the jobs created with the aid of public funds are later abolished as a result of the economic and financial difficulties encountered by the firms concerned. Consequently, the measures which have been introduced with a view to the creation of new vacancies cannot be considered as satisfactory: They appeal to the employers' desire to take the best advantage of the unsettled employment situation, without at the same time compelling them to provide, in permanent fashion, work corresponding to the qualifications of all the workers relocated in their factories.

The provisions relating to occupational reconversion apply only to the occupations laid down by the Ministry of Labour. It seems unlikely that the workers in the aircraft industry will follow such courses to any great extent. The least skilled workers in the industry are the only ones who could expect to obtain employment after these courses at the same earnings level as previously.

It might be said that agreements signed with the Ministry of Labour would enable down-graded workers to maintain their earnings at an acceptable level (90 per cent of previous earnings) during the first six months after their transfer, but they would subsequently have to bear the full brunt of their down-grading. Anticipated retirement provisions would apply to only a small proportion of those concerned, and the selection operated by reference to age might well fail to be consonant with the requirements of technical progress. It should not be forgotten that the French aircraft industry has developed only recently, so that most of the workers it employs are in the younger age groups.

It can thus be said that the measures to counter fluctuations in employment would be ineffective if the aircraft industry were to enter a period of severe crisis. The high degree of specialisation in the industry, together with its geographical location, are important factors which would make it particularly difficult to find adequate solutions to this type of problem.

The position is not as difficult when we consider the electronics sector working for the aircraft industry. These special activities are carried out by firms with a wide range of production, so that there is every sign that the personnel involved would be able to adapt to new production lines without too much difficulty. The aircraft industry is a priority customer for the electronics industry, with which it places substantial orders, but if this outlet were to be lost other items of production could well afford part compensation for this.

The position is not the same where the aircraft industry proper is concerned, and the attempts made in some factories to introduce alternative production lines have not met with the success which was hoped. Consequently, other solutions must be found in order to avoid, or at least mitigate the effect of economic and technological trends.

LINES OF INVESTIGATION

- THROUGH A MORE PRECISE ASSESSMENT OF THE EMPLOYMENT PATTERN

The fact that we were able to obtain only vague information about the employment trend in the aircraft industry illustrates the inadequacy of the factual records available. As things stand, it would be impossible to draw up a reconversion programme capable of general application in all the cases where serious difficulties arose affecting either the industry as a whole or some part of it which was of vital interest to a particular region.

It is essential to carry out a listing and a description of all the major occupations and to discover the alternative employment which could be considered for each one of them if the industry were hit by an economic crisis. Once this has been done, it will be possible to make appropriate arrangements for additional training and to list the types of work which could be carried out by workers at present in the aircraft industry.

Another survey, this time of personal and family situations, would then make it possible to assess more accurately the limits to a policy of cutting down on personnel by geographical transfers and anticipated retirement schemes. It should be relatively easy to collect this kind of information and to pass it on to the appropriate bodies.

- BY LEVELLING-OUT THE FLUCTUATIONS IN ACTIVITY

It would be possible to reduce the variations in the volume of activity by placing with the aircraft factories orders for which their plant and personnel are particularly suited. We are thinking on the lines of providing services to other firms rather than of a permanent reconversion to the manufacture of products for direct consumption. This appears to be a valid solution in the case of certain machining jobs, and could be based on the experience already acquired under the contracting-out grants scheme: contracts awarded under this system should include clauses which prevent sub-contractors from paying abnormally low salaries and compelling them to comply with statutory and administrative provi-ions relating to the type of work involved.

A survey should be made of the areas in which the plant and personnel in the aircraft industry could assist with the work being done by other firms in different lines of activity, and conversely, of the firms which could cover operations if the volume of orders exceeded the fixed capacity of the aircraft industry itself. Studies of this kind are of the utmost importance for the highly specialised sectors of the industry, such as the design and research offices, or the airframe and aero-engine workshops. The results of these investigations might not be fully satisfactory for all the sectors concerned, but they ought nevertheless to reveal some of the means by which variations in the level of activity can to some extent, be ironed-out, thus reducing the danger of large-scale fluctuations in the level of employment which is a permanent threat to workers in the aircraft industry.

- BY AVOIDING REGIONAL SPECIALISATION

The crises consequent on reduced employment possibilities are exceptionally serious when they affect a mass of workers representing a large proportion of the population of the area and when there are no opportunities for alternative employment in the area. Because of this, those regions and districts whose economic life is dominated by a single industry are in a much more exposed position than those where the industrial pattern is more diversified. For instance, the crises hitting the textile industry, ship-building and coal-mining have been severely felt by certain towns and have resulted in social unrest. The experience of the last few years in this respect teaches us that an economic crisis arising out of depressed conditions in one industry can be much more easily counteracted when there are factories in the area belonging to other industries. It is less costly to develop the activities of an existing factory than to build an entirely new one, and an extension of production offers greater security to the workers concerned. Moreover, the workers themselves are more willing to accept new jobs in a firm with whose activities they are familiar than in a new undertaking where the security of employment may be doubtful.

These observations suggest a number of recommendations which should be examined and implemented without delay. In each region where the aircraft industry represents a major branch of activity, other types of production should be encouraged. For example, the creation or extension of other activities could be encouraged by granting assistance similar to that provided for reconversion operations. This kind of arrangement is consonant with the overall policy of regional community development, but we would like to stress the priority claims of those regions whose economic life depends mainly on a single industry which is itself highly sensitive to economic phenomena of a hardly foreseeable nature, and in particular the regions whose economic mainstay is the aircraft industry. By this means, it could be hoped to create the conditions for the necessary degree of occupational mobility without requiring the workers to subscribe to unacceptable material or moral sacrifices.

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FRANCE

Experience with Manpower Programmes

by G. Laroussinie (CIERP)(1)
in collaboration with C.F.T.D.
officials in the SNECMA and
SUD-AVIATION Companies

I. RELOCATION OF WORKERS - A Case History

A brief investigation in our Works Sections revealed the extent of relocation operations in the Aircraft Industry (see Annex 3).

As we were asked to give only a short report we have decided to describe how only one of these operations was carried out. It was one in which the Unions played an active part which is sufficiently recent to be an example of the present position.

1. THE FIRM CONCERNED: THE SNECMA COMPANY (Société Nationale d'Etudes et de Construction de Moteurs)

This firm, which was nationalised in 1945, currently employs 12,700 workers, i.e. 13.5 per cent of the total labour force in the Aircraft Industry and 67.3 per cent of that employed on the design and construction of aero-engines.

The expansion of the Company's industrial potential was governed by the official regional development policy. It took the form both of decentralisation and of a concentration of the installations in the Paris area.

The main relocation operations affecting the personnel

These various decentralisation and concentration moves have caused in the past, and are due to cause in the future, numerous transfers of personnel, i.e.:

	Number of workers affected
Kellermann (Seine) - Villaroche (Seine & Marne), 1946-47	
Villaroche (S & M) - Kellermann (Seine), 1963	
Villaroche (S & M) - Istres (Bouches du Rhône), 1963	33
Villaroche (S & M) - Bordeaux, 1963-65	95
Kellermann (Seine) - Villaroche, 1965	450
Kellermann, Billancourt & Suresnes (Seine) - Corbeil (Seine & Oise), 1967	Negotiations in progress.

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(1) CIERP Centre Intersyndical d'Etudes et de Recherches de Productivité

Before analysing the conditions in which the VILLAROCHE-BORDEAUX move took place, it is appropriate to stress that the decision to relocate and the choice of the new site were the result of GOVERNMENT pressure.

Purpose of the VILLAROCHE-BORDEAUX Operation

To transfer the Rocket Department (space activities) from VILLAROCHE to BORDEAUX - a distance of 600 km. The staff to be relocated consisted of 160 highly specialised technicians and supervisory grades: there was no reconversion problem, merely one of relocation.

The manual and clerical workers were not moved to BORDEAUX, but were recruited locally.

The Union Situation in 1963

	Registered members	Votes recorded	C.G.T.	C.F.D.T.	C.G.C.
Lower grades	1,100	1,020	66.08%	33.92%	-
Higher grades	630	560	33.93%	45.53%	20.53%

The C.G.T. was, at the outset, opposed to any personnel transfers at all (this was their attitude on previous similar occasions).

The C.F.D.T. was not opposed to the transfers in principle, provided that the interests of the personnel were safeguarded (see letter attached).

The C.F.D.T., supported by the personnel, had to take a very firm stand in order to prevail upon the C.G.T. to come round to the idea of negotiating the terms of transfer. In this connection, the strong position of the C.F.D.T. in the technicians and supervisors group should be noted - 45.53 per cent of the total.

Finally, both Union organisations combined in joint action throughout the period concerned, including the negotiations.

2. THE AIMS OF THE TWO PARTIES TO THE NEGOTIATIONS

The following table sets out the aims of the C.F.D.T. and the SNECMA Management respectively.

C.F.D.T. OBJECTIVES	MANAGEMENT OBJECTIVES
Fundamental aims 1. To obtain maximum guarantees and compensation for workers making the move, for those staying behind, and for those who wish to return, without opposing the decentralisation policy.	To grant the minimum guarantees and compensation compatible with the need to relocate, the cost of the operation, the value as a precedent (i.e. as a reference basis for future operations) and the risk of industrial unrest.
2. To establish the C.F.D.T. in the Bordeaux factory (this was achieved)	
Tactical aims 3. To have the Union organisations recognised as partners in the negotiations for an average basis of guarantees applicable to all, on which individual negotiations would subsequently be based.	To negotiate each case separately, without any reference to the Union organisations
4. To obtain the signature of an agreement in respect of the SNECMA as a whole. (Present and future.) Refusal of an agreement limited to the Bordeaux move only.	To avoid signing any agreement in respect of future moves.
5. To start discussions at the earliest possible moment, so as to avoid being faced with a fait accompli in respect of: - conditions of transfer to Bordeaux; - conditions of occupational adjustment at Villaroche.	To delay discussions with the Union organisations as much as possible. - as the management's primary aim was the move to Bordeaux, the adjustment procedures at Villaroche were delayed to the maximum, with a view to creating a climate favourable to the transfer (i.e. a climate of uncertainty as to the possibilities of adjustment).

3. TIME-TABLE OF OPERATIONS

Annex 2 contains a table showing the chronological sequence of events.

The time-table brings out the following factors:

(a) The C.F.D.T. stated the problem (see attached letter) and then, together with the C.G.T., obtained recognition by blocking the management's sources of information (refusal to complete the housing questionnaire sent to the personnel, etc.).

(b) The Management agreed to open discussions only four months after the conflict had started (see C.F.D.T. letter). An attempt was made to short-circuit the Unions by making proposals directly to the 30 workers involved, with a view to obtaining their agreement on the transfer and the terms offered.

(c) Regular inter-union information was given to the personnel. A communiqué was issued after each discussion. Two general meetings were held before the final decisions were taken. The personnel gave its full support to the Union Delegates.

(d) The first phase of the operation came to an end in October 1963, when a unilateral decision was taken by the Management (refusal to sign a protocol of agreement and offer of insufficient guarantees).

(e) At the beginning of 1965, the Management delayed or slowed down reconversion measures in order to help the transfer scheme (creation of a climate of insecurity at Villaroche).

(f) During the first phase of negotiation, the Union organisations focused their attention primarily on the guarantees to be given to transferred personnel.

During the second phase, as from February 1965, they were especially concerned with the following matters:

- the Bordeaux production schedule;
- the redeployment, at Villaroche, of those who stayed behind.

4. SCHEDULE OF CLAIMS AND GUARANTEES OBTAINED

Schedule of Claims submitted on 11th September, 1963	Final position of the Management, adopted on 16th October, 1963
I. HOUSING	
(1) Accommodation provided from the outset, whatever the final choice of the persons transferred.	- Provision of rented accommodation, against written guarantee that such accommodation would be placed at the disposal of the Company on leaving the area, either during or following the readaptation period.
(2) New accommodation to be subject to prior inspection by transferred worker and his wife, with weekend living and travelling expenses paid at S.N.C.F. rates.	- 2nd Class return fare to be paid for workers on the transfer list and their wives, journey to take place at a weekend.
(3) Travelling and installation expenses to be paid for whole family of transferred workers at S.N.C.F. rates.	- Final installation to give entitlement to payment of travelling expenses of workers and families transferred or recruited in Paris area for employment at Bordeaux. SNECMA to recover State compensation payments.
(4) Removal expenses to be reimbursed against supporting bills.	- Reimbursement granted; - SNECMA to recover State compensation payments.
(5) Two days' paid leave for: - removal (two days following or preceding a weekend); - settlement of any bona fide problems, such as sale of accommodation in Paris area.	- Two days' paid leave following or preceding a weekend.
(6) Interest-free, long-term loans for house building.	- Medium-term loans (five years) at 3 per cent, with ceiling of F.15,000.

Schedule of Claims submitted on 11th September, 1963	Final position of the Management, adopted on 16th October, 1963
(7) Cash loans in respect of transfer of goods and chattels.	- Short-term loans for workers owning houses in the Paris area who wished to sell out and buy new property near Bordeaux. Repayment period of six months at 3 per cent, with ceiling of F.30,000.

II. COMPENSATION
(1) "Neutralisation" period of six months:
- allowances not deductible from the overall allowance and not subject to repayment in case of return to the Paris area;
- a special daily allowance of:
  - F.38.40 for "Cadre" employees
  - F.30.75 for others.	

(2) "Adaptation" period:
- six months at same rates as above.
	(a) "Reflection" period of two months after leaving the Paris area:
	  - 1st month: displacement allowance;
	  - 2nd month: displacement allowance deductible from the overall allowance (see below).
	(b) "Adaptation" period of four months as from the end of the reflection period (at the end of this period, the personnel concerned are considered as finally transferred).

(3) Overall Transfer Allowance (removal of discrimination between "cadre" and other personnel): - lump sum compensation of.....F.4,500 - increase per child of....... F.450.	- Purpose: to facilitate the resettlement of personnel. "Cadre" category Unmarried.................. F.3,000 Married, no children....... F.4,500 Per dependent child........ F.450

Schedule of Claims submitted on 11th September, 1963	Final position of the Management adopted on 16th October, 1963
	Others Unmarried..................... F.2,500 Married, no children .... F.3,750 Per dependent child .... F.450 The allowance is payable on signature of the rider to the service contract, i.e. at the end of the 2nd month of the "reflection" period.
(4) Indemnity for lack of Staff Canteen facilities - per diem F.5	Indemnity of F.3 per day of attendance at work ("Cadre" and other categories). Indemnity to be abolished as soon as canteen facilities provided.
(5) Payment on account: - tied to signature of the contract	
III. EMOLUMENTS (1) Emoluments to be fixed at the same rates and subject to the same conditions as in the Paris area. (2) Emolument to be indexed on the average rates paid for each category to SNECMA employees in the Paris area, so as to ensure equality of treatment between Paris and the Provinces	- Salaries of monthly-paid employees other than "cadres" - present salaries to be continued, but subsequent increases to be based on local (Bordeaux) rates. - The value of the salary "point" fixed at 2.92 (i.e. 4 per cent less than the Paris rate). Salaries of "cadre" staff: - to be established at the same rates and subject to the same terms as in Paris. Application to Bordeaux of the provisions of any general wage increases granted under SNECMA bargaining agreements.
IV. SECURITY OF EMPLOYMENT (1) Workers refusing transfer - re-employment within the company, without loss of earnings and in an equivalent post	- workers refusing a transfer to be found other work within the company as far as possible. - those workers who, in spite of all the efforts made, cannot be given other employment, to be awarded compensation at the normal rates.

Schedule of Claims submitted on 11th September, 1963	Final position of the Management adopted on 16th October, 1963
(2) Workers transferred (rider to service contract)	- Workers transferred to be offered the possibility of signing a rider to their service contract, such rider to be signed not later than at the end of the 2nd month of the reflection period.
(3) Workers refusing permanent transfer after the end of the six-month adaptation period: - re-employment within the company without loss of earnings and in equivalent work; - rehousing on equivalent scale to former accommodation.	- Period of "reflection": two months as from leaving the Paris area. - Period of "adaptation": four months as from the end of the period of reflection (personnel considered to be permanently transferred). Workers unable to adapt would return to the Paris area at their own expense. Every effort would be made to find them employment in the company's factories in or near Paris. - Such workers who cannot be found new employment would be entitled to compensation at the normal rates.
(4) In the case of redundancy at SNECMA-Bordeaux, the company to undertake that the worker concerned will be: - provided with other employment in the Paris area, preferably at his former place of work, without loss of earnings and in an equivalent post; - brought back to the Paris area at the firm's expense (i.e. travelling and removal expenses paid for himself and family); - rehoused.	- The company undertakes to pay the travelling and removal expenses, to the Paris area, of all workers dismissed for technical or economic reasons before 31st December, 1965. - The company will do its utmost to find such workers new employment either in its own factories or with other firms. Failing this, the workers concerned would be entitled to compensation at normal rates. - The company would be unable to ensure rehousing.
V. RETURN LEAVE: at discretion of worker: - monthly journey paid entirely by the firm, who would also assist (to the extent of F.100) with a second journey each month, or	

Schedule of Claims submitted on 11th September, 1963	Final position of the Management adopted on 16th October, 1963
- paid leave and travelling expenses on Public Holidays, for workers and families (S.N.C.F. rates)	
VI. EDUCATION - registration in appropriate schools ensured; - compensation for books, etc. which have to be replaced.	- No difficulties anticipated in this connection.
VII. FURTHER VOCATIONAL TRAINING - further training course (E.N.S.A., C.E.S.M., etc.); - continuity of C.N.A.M. courses - continuity of "Y" (départemental) courses, with the same prospects for trainees.	
	VIII. COLLECTIVE WAGE AGREEMENT TO BE APPLIED: - Until the end of the adaptation period (six months), the agreements applying to the metalworking industries in the Paris area will be applied; - as from the end of that period, application of the agreements relating to the metalworking industries in Bordeaux and the Gironde département.

2nd stage of the negotiations

Claims put forward in Feb./March 1965	Management position
Security of employment for workers not transferred - possibility of immediate transfer - notification of vacancies - cessation of recruiting from outside.	- 99 per cent of all workers not transferred to be found new jobs (this was later to be jeopardised) - transfer delays not to exceed two months - lists of vacant jobs to be communicated.
Personnel transferred to Bordeaux - two months' pay, instead of only one, as compensation for transfer	- same as for first wave of departures.
- an increase in the lump sum compensation on the same scale as the displacement allowance, i.e. 12 per cent; - security of employment (as above)	- an increase of 10-11 per cent - same as for first wave of departures
- provision of housing on departure	- in the absence of adequate housing facilities immediately available, the firm undertakes to pay the difference between uncontrolled rents (subject to to a ceiling) and rents in HLM- or LOGECO-type subsidised buildings. - LOGECO-type accommodation to be provided later for "cadre" personnel. - HLM-type accommodation to be provided for other categories.

5. THE RESULT OF THE OPERATION

(a) Results of the discussions held in October 1963

The following communiqué was issued to the personnel by the two Union organisations on 10th October, 1963:

"The results of these discussions show that:

- as concerns housing and security of employment, a positive result can be reported;

- on the other hand, as concerns guarantees in respect of the future earnings trend and the amount of the lump sum compensation to be paid, the management has made no significant concessions.

This shows, once again, that discussions are not sufficient in themselves and that they must be supported by direct action on the part of the personnel.

WE WISH TO STRESS THE FACT THAT THE CONDITIONS OFFERED ARE NOT THE RESULT OF AN AGREEMENT BETWEEN THE MANAGEMENT AND THE UNION ORGANISATIONS. THEY STEM SOLELY FROM A DECISION TAKEN BY THE MANAGEMENT.

From here on, each member of the personnel must accept his full personal responsibility and decide what attitude he is to adopt.

The Union organisations will continue to take joint action, whenever required, to assist the personnel in the course of the Bordeaux operation."

(b) The status of the operation in May 1966

Roughly 60 per cent of the workers who were asked by the management to move to Bordeaux have agreed to do so.

Of the remaining 40 per cent, 33 per cent were found other employment inside the firm and 7 per cent resigned immediately the operation started.

Only two persons applied for return to Villaroche at the end of the adaptation period.

(b)(1) The personnel transferred to Bordeaux were faced with a whole series of problems, of which a number are still awaiting solution:

- the "volunteer" status of transferrees. The Managing Director of SNECMA had declared that the transfers were to take place on a voluntary basis. In actual fact, however, the high degree of specialisation of those involved, together with the uncertainty of reconversion to another speciality, the moral pressure exerted on workers in the course of private interviews, and so on, considerably reduced the voluntary nature of workers' decisions.

- creation of divisions among the personnel. The conditions under which the operation took place tended to divide the personnel into three distinct categories: those recruited locally in Bordeaux, the first wave of arrivals from Paris and the second wave from Paris. Not included in any of the above categories are the workers recruited in Paris for posting direct to Bordeaux.

A first factor of discrimination was the fact that workers transferred from Villaroche retained their Paris-based earnings, whereas those recruited locally were on the regional scale, which is 4 per cent lower.

The individual bargaining system destined to encourage applications for posting to Bordeaux was practised by the Management on a much larger scale in 1965 than in 1963:

this created a further distinction between the two transfer waves.

The consequences of this second factor appear to have been augmented by the wage-freeze and the statements made by the Management, i.e. "The second transfer stage has to be paid for".

Available housing was allocated with priority being given to workers from Paris.

- the housing problem. Although, for the first wave of about 30 persons, this problem was settled according to plan and as promised, the second wave was not so fortunate. In December 1966 there will still be a shortage of 23 dwellings: the Local Authorities appear to have failed to keep their promises in this respect.

In the absence of moderate-priced accommodation for the personnel, the Management continues to pay a rent allowance equal to the difference between the standard rent adopted and the rent actually paid. At present, the Management is attempting to withdraw from this expensive commitment by offering a large lump-sum payment in lieu of the monthly allowance. Furthermore, the Management's assessment of rents, issued in April 1965 (i.e. the unrevised figures for 1963), represents no more than half the actual figures.

- future prospects. This is undoubtedly the problem which is causing the greatest concern to the personnel in Bordeaux:

(a) the forecast of the growth of the Bordeaux establishment has not been met; for example, a total of 1,000 workers was forecast by 1965, whereas the actual figure was only 450;

(b) for the younger workers, prospects of promotion appear to be very limited;

(c) for all categories, the airspace industry appears to have a very uncertain future. The possibilities for finding alternative employment in the area (which is not an industrialised one) if a crisis arose, are virtually nil. The feeling of insecurity is further enhanced by one of dependence on the present employer;

(c) in some departments, those who leave are not replaced.

- the problem of outside work for housewives. Some of the workers' wives who want to go out to work have great difficulty in finding a job in Bordeaux.

These factors, and several others, have prevented the establishment of a climate favourable to the success of the transfer operations.

(b)(2) Redeployment of personnel who refused to move to Bordeaux

In spite of the Management's dilatory approach to providing alternative employment for the workers remaining in the Paris area, which was designed to make the move to Bordeaux more attractive, this part of the operation was on the whole carried out smoothly.

(b)(3) The C.F.D.T. attained one of its aims - that of establishing itself in the Bordeaux factory.

6. CONCLUSIONS REGARDING THE RELOCATION OPERATIONS

Under this heading, we would like to draw attention particularly to some of the various problems encountered by workers who move to other parts of the country.

In a relocation operation there are two broad categories of personnel: those who stay behind and those who go.

A. THE PERSONNEL REMAINING BEHIND

This category includes both those workers who are not offered the possibility of moving and those who, having applied to move, are not accepted. It is composed of not very highly skilled workers, in both the manual and clerical grades. The following example relates to the transfer of SUD-AVIATION personnel from the factory at LA COURNEUVE to that at MARIGNANE in 1961-62:

Dismissals	414
Resignations	387
Retirements	51
Transfers to Marignane	46
Total	898

The 46 persons transferred included 12 engineers, 5 test pilots, 4 senior technicians, 5 charge hands, 1 process chaser, 7 junior technicians, 1 flight mechanic, 2 ground mechanics and 4 fitters. The claims to be made on behalf of the personnel remaining behind can be summed up as follows:

(1) No dismissals to take place without retraining facilities being provided for those dismissed.

(2) Retraining to be organised in accordance with certain principles, i.e.

- former grading and earnings to be maintained during the retraining period and guaranteed in the new occupation;
- retraining to be directed, wherever possible, to trades similar to those previously exercised and to consist of supplementary training courses held during working hours;
- subsequent resettlement to consist of new employment either in the same firm or in another firm located in the area, so as to avoid any uprooting;
- the various disadvantages (increased travel costs, changed housing conditions, etc.) resulting from the change to be evaluated and compensation to be granted.

(3) When the unfortunate position arises where dismissals not accompanied by organised resettlement arrangements are inevitable, because of the bad bargaining position or of the economic situation, the following aims should be pursued·

- period of notice to be extended, while at the same time allowing workers who find other employment to leave without hindrance;
- compensation payments for hourly-paid workers to be increased;
- workers aged 60 and over to be allowed to retire with benefits corresponding to those to which they would normally become entitled at age 65;
- dismissed workers to be given priority consideration for subsequent vacancies arising inside the firm;
- the employer to supplement the unemployment benefits paid by the State and the ASSEDIC (this is a body managed jointly by both sides of industry - "Association pour l'Emploi dans l'Industrie et le Commerce").

B. THE PERSONNEL TRANSFERRED

The problems arising for this category of personnel and the claims to be presented on

their behalf have already been described above, in the context of the Villaroche/Bordeaux Case History. At this point, we will merely reiterate the main headings:

(1) Housing - advance inspection of accommodation, removal expenses, sale and purchase of accommodation, loans, temporary housing, length of leases, etc.

(2) Earnings - maintenance of earnings levels, rate of subsequent increases, regional weightings, locally-recruited personnel, etc.

(3) Miscellaneous grants and allowances - lump payment for installation expenses, displacement allowance, hotel expenses, allowance in lieu of canteen, etc.

(4) Education - registration in schools in new area, provision of school buses, compensation for extra expense caused by change of schools during the school year (e.g. different books required), etc.

(5) Security of employment - in case of redundancy, provision for re-employment, rehousing, return to home area, removal and other expenses, etc.

(6) Further training - provision of facilities for attending vocational training courses (e.g. those organised by the Conservatoire National des Arts et Métiers), continuity of in-firm training schemes, etc.

(7) Home leave - to compensate for the fact that the move increases the cost of maintaining family ties: paid leave and travelling expenses.

(8) Collective Bargaining Agreement - which Agreement is to apply to the personnel transferred.

(9) Personnel who apply to return home in the early months following the transfer (e.g. six months later) - provision for a period of adaptation during which the workers concerned are found new employment on equivalent terms in the firm and area of origin.

(10) Provision of facilities for such vocational retraining and readaptation as may be necessary.

II. RECONVERSION OF WORKERS: TWO CASE HISTORIES

The first part of this report was concerned with the problems which arise in connection with the relocation of workers, and attention was drawn to the situation of those workers who decline to make the move and who are sometimes compelled to retrain for alternative employment either within the original firm or elsewhere in the area.

Part Two will be concerned basically with occupational adjustment made necessary by reconversion of the factory to making new products.

From the outset, it should be recalled that reconversion of production entails organisational changes, giving rise to two types of problem, i.e.:

(a) those involved in the internal re-allocation of tasks;

(b) those created, in some cases, by measures to reduce the payroll or introduce shorter working hours, or both.

We have selected as examples two reconversion case histories relating to the same firm (SUD AVIATION) and to the same area (SAINT NAZAIRE): in both cases, the reconversion was effected without any dismissals being necessary.

1. DESCRIPTION OF THE FIRM

Société Nationale de Construction Aéronautique, Saint Nazaire works.

Products: fuselages for "Mystère 20" aircraft,
tail structures for "Caravelle",
nose structures for "Caravelle", etc.

Establishment in 1961 and Union positions at the time of the change-over

	Registered workers	Votes recorded	C.G.T.	C.F.D.T.	F.O.
Manual grades	2,076	1,579	52.12%	29.76%	17.73%
Others	496	387	47.02%	26.61%	26.35%

2. CASE HISTORY No. 1, INDUSTRIAL TOOLMAKING AT SUD AVIATION

In describing this case, we will first of all give a series of extracts from a paper presented by Monsieur DESSEIGNE to the Conservatoire National des Arts et Métiers under the title "Evolution de l'emploi dans l'Industrie Aérospatiale Française".

The second part of the case history consists of a number of observations put forward by the Union organisations in Saint Nazaire.

(1) Description of the operation (taken from the paper by Monsieur DESSEIGNE)

"The creation of an industrial tools department in the Saint Nazaire factory was one of the first diversification measures to be decided upon by the Company in 1960, against the background of the employment problem which could be foreseen at that time in connection with the factory's activities. This particular type of activity was chosen primarily because it corresponded to a demand on the national scale: the manufacture of industrial tools was very badly organised and depended on a sub-contracting system which increased industrial manufacturing costs considerably.

The first problem to be solved by SUD-AVIATION was that of achieving a good competitive position in spite of the high cost of initial capital investment, representing 1 milliard old francs. On the other hand, a favourable factor was the versatility of aviation workers and their familiarity with tools made of special steels.

In view of the technical unfamiliarity and difficulty of work on coachbuilding tools, it was necessary to provide for a large-scale programme of training at all levels.

However, the work was interesting in itself and called for manual skills similar to those prized in the aircraft industry together with a high level of skill so that the reconversion of airframe fitters to motor body fitters was a fairly easy operation.

At the present time, out of a total of 350 toolmaking fitters, 150 are employed on industrial tools intended primarily for the automobile industry. Their breakdown by gradings is as follows:

50 P1	50 P2	50 P3

The OP3 grades are acknowledged to have higher level of skill entitling them to an additional grade.

The factory includes a Tool Designing Shop employing 50 draughtsmen, a number of whom are specialised in stamping tools. It can be said that this reconversion operation, although requiring additional facilities and heavy investment, is an interesting experiment likely to provide employment for skilled workers in the aircraft industry. At the same time, it is hardly likely to develop on a wider scale and it would be unwise to conclude that the means provided will at a later stage be capable of integration into the development of new kinds of aircraft production or, more important, that they will be the answer to any wholesale reduction in the demand on the industry as a whole."

(2) Some reactions by Union organisations

The reconversion operation has had a number of positive aspects:

(1) it took place gradually and there were no dismissals or down-gradings;

(2) the training for reconversion was organised during normal working hours. Earnings at tool-sharpener rates increased by an average bonus of 37 per cent were guaranteed throughout the length of the course (about three months) and for a further adaptation period of one month;

(3) for a number of workers, the reconversion resulted in promotion and improved skills, with the fitters being given training as millers or turners;

(4) the Management quite often draws on this highly skilled pool of workers for promotion in other departments of the factory;

(5) the creation of the new jobs led to reconversion for some of the workers from the Saint Nazaire Foundry: e.g. pattern-makers (wood) becoming pattern-makers (plastics).

The operation has also some undesirable consequences, however, from both the union and the social points of view, i.e.:

(a) the conditions of work are more unpleasant than in conventional aircraft factories, because of the noise (e.g. the press), the nature of the work (e.g. grinding), the materials used (e.g. cast iron) and the supervisory staff, some of whom were recruited in the Paris area, who are considered to be "hard drivers";

(b) it is difficult to bring such highly skilled workers, employed in an unpleasant work environment with promotion on an individual basis, into the unions although in this particular case the C.F.D.T. seems to have the best chances of attracting the workers concerned.

3. CASE HISTORY No. 2, MANUFACTURE OF "CARAVELAIR" TRAILER CARAVANS BY SUD-AVIATION

In the same way as above, we will first of all quote from Monsieur DESSEIGNE's paper presenting the case and follow this by some union observations.

(1) Description of the operation (taken from Monsieur Desseigne's paper)

"It was also in 1960, and for the same reasons, that SUD-AVIATION considered the possibility of manufacturing caravan trailers at the Saint Nazaire factory. The problem was to find a new production line capable of giving employment to between one and two hundred workers.

It was at first intended to manufacture a metal-bodied trailer, as this was fairly similar to aircraft construction techniques. However, following a survey carried out in the United States, this idea was abandoned on account of the high level of investment, especially in tooling. It was finally decided therefore to manufacture a wooden-bodied trailer: this obviously meant that the trades and skills required would be different. In 1961, the production chain went into service and by July 1962 1,200 trailers had been manufactured.

In February 1964, the personnel working on trailer production was as follows:

50 production workers from SUD-AVIATION
142 " " " outside (1)
25 administrative and maintenance workers from SUD-AVIATION
217 workers in all.

Most of the tradesmen are semi-skilled workers or P1 grades, with the addition of one or two P3s.

In spite of the fact that the after-sales service system implies high standards of quality, this type of work is far removed from that generally carried out in the aircraft industry. Reconversion operations of this kind, therefore, although suitable for providing work for some joiners and carpenters who would be hard to fit into modern aircraft construction, cannot be considered as a solution to the general problem of redeploying the workers in the aircraft industry: in the first place, the trades and, especially, the levels of skill required are very different and, secondly, this is an activity whose growth is bound to be gradual and difficult."

(2) Some reactions by the Union organisations

Unlike the case history described earlier, this operation is not considered by our union colleagues to have been a truly successful one, for the following reasons:

(1) as a general rule, the level of skill required is lower than that in the aircraft industry as a whole, so that the new development offers few prospects of promotion for workers who enter it;

(2) unlike aircraft production, the new branch relies on a high degree of job-splitting and on mass-production techniques similar to those in the motor vehicle industry (e.g. it is planned to produce 4,100 trailers during 1966);

(3) Management's desire to remain competitive on the trailer market is reflected in the attitudes of the supervisory grades and thus in those of the workers themselves. This again creates an unpleasant atmosphere;

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(1) The outside workers were "hired" on a temporary basis, in accordance with the usual system applied by the local shipyards.

(4) a typical feature of the workshop is the extensive reliance on temporary labour recruited by "human cattle dealers". This policy is due to a number of factors: in the first place, the markedly lower wages paid to temporary workers enable costs to be cut; secondly, no personnel troubles arise when production schedules are reduced.

To sum up, although it has created a certain amount of new employment in the area, this operation cannot be considered as either a social or a professional success.

III. GENERAL CONCLUSIONS

The different experiences we have had on the relocation and redeployment of workers enable us to draw some general conclusions which go beyond the specific cases we have just described.

1. There are, in France, no negotiations at national level between workers' and employers' organisations on the relocation and retraining of workers.

2. Consequently, any social provisions in connection with such problems are made essentially by firms, or indeed factories. The provisions made are the outcome of various factors such as the bargaining strength of the parties, the number of workers involved in the transfer, the management's approach to personnel problems, and so on.

3. In this industry, the part played by political power appears to be overriding, both as concerns the work load and decentralisation.

4. In view of the two preceding points and of the trend of technical progress, it appears to us that the unions' attitude cannot be one of systematic opposition to these transfer and retraining projects.

Consequently, there must be negotiation at both national and enterprise level, in order to safeguard workers' interests to the utmost.

However, if such negotiation is to be really effective, it must cover the whole field of employment problems, i.e.:

- vocational training and readaptation;
- planning of work load;
- length of working hours;
- conditions of recruitment etc.

5. Finally, reference should be made to a particularly important point - the lack of accurate information on the economic situation, employment forecasting and statistics about the labour force.

This lack of information is bound to distort judgement as well as possible negotiations and enables the employers to practise a policy of "fait accompli" by retarding to the utmost the information given to unions.

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ANNEX I

CFDT INFORMATION SHEET SENT OUT WITH QUESTIONNAIRE

CFTC
VILLAROCHE SECTION

Monsieur René CHILIN,
CFTC Personnel Delegate,
Department YCRX,
VILLAROCHE

Villaroche, 3rd May, 1963

To: Monsieur GARNIER,
Technical Director

Sir,

According to information which has reached me, the decentralisation of the YC department activities to BORDEAUX is now taking shape, at least in part.

Measures of this kind will clearly have important consequences for the personnel involved, on the personal, family and social levels.

May I remind you of the attitude of the CFTC at the time when staff were transferred from Villaroche to Suresnes and Kellermann. We are not opposed in principle to any necessary transfer and decentralisation measures, but it is our function to ensure that the interests of the personnel are safeguarded during such operations. As you yourself are aware, men cannot be moved around in the same way as machines, and we are therefore sure that you will understand our desire to make an immediate approach to solving the problems which the intended decentralisation moves will not fail to raise. On our side, we have already proposed that an annex should be added to the Factory Agreement with a view to safeguarding the interests of the personnel in case of transfer or decentralisation. Unfortunately, the Management's position on this point seems to be no more positive than in other directions.

We therefore consider that a meeting should be organised to discuss these problems. On the assumption that you will agree to the principle of such a meeting, we would like to propose the following procedure:

- submission by us to you of a document setting out the matters which appear to us to be of vital concern;
- discussion meeting;
- assuming the agreement is reached, signature of a Protocol.

We venture to draw your attention to the fact that open and prior discussion of the problems involved would contribute to the execution of the decentralisation project in the best possible conditions.

Please accept, Sir, ...

ANNEX 2

THE TIME-TABLE OF OPERATIONS

Date	Union moves	Management action	Joint meetings
4. 5.63	CFDT letter requesting the opening of negotiations sent to the management and circulated to the personnel		
6. 6.63	CFDT/CGT agreement for joint action and information: the management's questionnaire on current housing situations blocked	Distribution, via the chain of command, of a housing questionnaire	
mid-June	General Meeting of the Personnel - establishment of a schedule of claims.		
July	ANNUAL CLOSURE OF WORKS		
1. 8.63		The 30 workers on the transfer list called for interview	
August 1963	All individual contacts stopped. A union delegation representing the 30 workers involved approaches the management		
3. 9.63	Information sheet sent out to the personnel		Talks with the management
4. 9.63	Information sheet sent out		
11. 9.63	Schedule of union claims handed to the management		
17. 9.63		Inspection by workers of accommodation offered	Talks with the management

Date	Union moves	Management action	Joint meetings
17. 9.63	Information sheet sent out to the personnel - inspection of accommodation blocked - information on State aid to firms undertaking decentralisation moves		
26. 9.63			Interview with the Managing Director
22. 9.63	Information sheet sent out		
30. 9.63	General Meeting of the Personnel		
2.10.63	General Meeting called to decide on future action to be taken. Vote taken on claims. Methods of action. Personnel accepting the transfer.		
4.10.63	Inter-Union Memorandum sent to the Managing Director		
8.10.63			Interview with Managing Director
10.10.63	Information sheet sent out		
14.10.63		Letter from Management to CFDT and CGT	
16.10.63		Note sent out to all personnel on the transfer list, setting out the terms offered (repeat of the earlier letter).	
Second wave of transfers			
24. 2.65		Notification to the personnel of transfer terms	
10. 3.65	Information sheet sent out		

	Union moves	Management action	Joint meetings
19. 3.65		Conference to discuss the problems arising out of the decentralisation measures	
22. 3.65			Union organisations put forward queries regarding resettlement
25. 3.65	Information sheet on resettlement sent out		
25. 3.65	Letter to Director of the Villaroche works concerning resettlement		
30. 3.65		Management letter to those on transfer list, seeking their agreement	
1. 4.65	Information sheet sent out. Replies to the management letter blocked, with a view to compelling the management to state resettlement terms		
5. 4.65		List of vacancies forwarded by the management to the union organisations	
8. 4.65	Information sheet sent out to personnel, giving list of vacancies		

25.5.65 11 workers still awaiting resettlement

ANNEX 3

EXAMPLES OF RELOCATION OF PERSONNEL IN THE AIRCRAFT INDUSTRY

Year	Factory of origin	Factory to which posted	Number involved	Occupational categories
1959	BREGUET - Aire S/Adour	BREGUET - Anglet	80	70 workers, 4 executives, 3 shop-floor supervisors, 3 control personnel
1962	" Paris XVIème	BREGUET - Vélizy (S & O)	150	Administrative, technical executives (transfer of headquarters)
1965	" Bayonne	BREGUET - Toulouse	75	All workers (transfer for 8-month period)
1965	" Nantes-Paris-Saint-Etienne	BREGUET - Toulouse	150	Manual workers and one or two control personnel (for 1-year period)
1963/64	NORD-AVIATION			
	Chatillon (Seine)	Les Mureaux (S & O)	70	Technicians and executives
1964	Chatillon (Seine)	Orly (S & O)	65	Technicians and executives
1965	Chatillon (Seine)	Montrouge (Seine)	48	Technicians and executives
1965	Chatillon (Seine)	Saint-Médard (Gironde)		(Volunteers plus locally-recruited personnel)
1966	Chatillon (Seine)	Bourges-[illegible]atines-Saint-Médard		
	SUD-AVIATION			
1960/61	Marignane	Héli Sce - Marignane	300	150 manual workers, 100 technicians, 50 executives
1965	La Courneuve	Marignane	200	100 manual workers, 50 technicians, 50 executives
1964/65	Courbevoie	Le Haillan (Gironde)	10	Executives and technicians who applied to move
1966	Marignane	Héli Sce - Marignane	200	100 manual workers, 50 technicians (HS merged with SUD-AVIATION) and 50 executives)
	MARCEL DASSAULT			
1958	Mérignac (Gironde)	S-A - Toulouse	150	Workers and foremen
		American bases	200	Workers and foremen
1961	Saint-Cloud (Seine)	Mérignac (Gironde)	10	Technicians
	SNECMA			
1946/47	Kellermann (Seine)	Villaroche (S & M)		
1962/63	Villaroche (S & M)	Istres (B du R)	33	Workers, technicians, technical supervisors, executives
1963	Villaroche (S & M)	Kellermann (S & M)		
1963	Villaroche (S & M)	Bordeaux (Gironde)	30	Technicians and executives
1965	Villaroche (S & M)	Bordeaux (Gironde)	65	Technicians and executives
1965	Kellermann (Seine)	Villaroche (S & M)	450	
1967	Kellermann (Seine)- Billancourt et Suresnes	Corbeil (S & O)		(negotiations proceeding)
	HISPANO			
1964	Bois-Colombes (S & O)	Orléans	5 to 6	Executives and technical supervisors
1966	Bois-Colombes (S & O)	Chatellerault	20	Workers and technicians

NETHERLANDS

by P.J. Vos,
Economic Adviser,
Netherlands Metalworkers' Union,
N.V.V.

1. The undertakings concerned

The Dutch aircraft industry consists almost exclusively of two undertakings:

(a) The N.V. Koninklijke Nederlandse Vliegtuigenfabriek Fokker (hereinafter referred to as "Fokker");

(b) the N.V. "Aviolanda" Maatschappij voor Vliegtuigbouw, (hereinafter referred to as "Aviolanda").

Together they employ a total of about 6,100 workers.

2. Location of factories

Fokker has three factories:

(a) The main works at Schiphol in the vicinity of the Airport of Amsterdam. Here are located the head offices and the aircraft development division. This is also where prototypes are built, brought into production and flight-tested. Number of workers: about 3,400.

(b) The Dordrecht Works, near the port of Dordrecht. Here the main activity is the production of major aircraft components, such as wings and fuselages. Number of workers: about 800.

(c) The N.V. Industriemaatschappij Avio-Diepen, an autonomous subsidiary is located near the military airfield of Ypenburg near The Hague. These works are mainly concerned with maintenance and repair activities. Number of workers: about 675.

"Aviolanda" has two factories:

(a) The works at Papendrecht south-east of Rotterdam which, once the Starfighter production programme had been completed, was turned over to other activities such as the production of flying boats, covered gangways for airfields, egg-containers, the supply of radio-telescopes to the N.V. Bronswerk-Fijenoord, various supplies to the Philips Company, jigs for the Fokker Workers, etc. Number of workers: about 750.

(b) The Woensdrecht Works, located near the military airfield of the same name. These works are mainly concerned with maintenance and repairs. Number of workers: about 500.

3. Production programme

The short summary of activities given above may be considered as complete so far as "Aviolanda" is concerned, but in order to have a clear picture of the Dutch Aircraft Industry, something more needs to be said about the Fokker production programme.

(a) Development and production of the firm's own prototypes

Since the resumption of activities in 1945, the following prototypes have been developed and/or put into production:

- S 11 and S 12 - trainers;
- S 14 - a jet trainer in use with the Dutch Royal Air Force;
- F 27 - the "Friendship" - a short and medium turbo-prop aircraft carrying 48 passengers. There are also military and freight versions of this aircraft, known as the "Troopship" and "Combiplane" respectively. 385 of these aircraft have thus far been built, including 166 completed by the Fairchild Hiller Corporation - the American licence holder.
- The F 28 - the "Fellowship" - a short and medium range jet passenger aircraft carrying about 65 passengers. The prototype is expected to make its first test flight in 1967.

(b) Building of military aircraft under licence

Since 1946 the Hawker-Seafury, Gloster-Meteor, Hawker-Hunter and Lockheed-Starfighter have been successively manufactured, the last three in runs of from 300 to 550. Once the Starfighter programme was nearing completion in 1965, the decision of the Dutch and Belgian governments regarding the production of a new tactical fighter to supersede the F 84F and a new trainer to supersede the T 53 has been, and still is being, awaited.

(c) Participation in the development and production of aircraft of foreign design

- Production of the centre-wing for the Breguet 1150 Atlantic;
- negotiations with the Vereinigte Flugtechnische Werke GmbH in Bremen regarding a 20 per cent participation in the development and production of the VFW 614 - a twin-engined short-range jet aircraft carrying about 36 passengers. This project is still very much in the early stages.

(d) Maintenance and repair of aircraft

These activities at present include:

- maintenance and repair of the aircraft of the Dutch, Norwegian and Danish air forces;
- maintenance and repair of the F 27 Friendships for both Dutch and foreign users.

(e) Space Research

A decisive step has been taken in the field of space research through the creation of a staff of scientists specially dealing with developments connected with such research. Fokker, together with Philips and the van de Heem companies, is consulting the Dutch Government concerning the possibilities of a national space research programme in which scientific and commercial considerations should be given priority. This is a direct result of the existence of national programmes in other countries, at the expense of an international programme, which would be much preferred in the Netherlands.

(f) Synthetic materials

In addition to the production of parts made from synthetic materials for the F 27 and F 28, the industry is concerned with the production of plastic dinghies and radar parts for military aircraft.

The production of panels for the building industry was undertaken on an experimental basis by the plastics division. This activity is now being pursued further.

(g) Miscellaneous

- development and production of radar antennae;
- production of protective covers for electronic apparatus;
- development and construction of electronic recording devices for aviation and navigation;
- development and production of various sorts of machine tools;
- components and accessories for various guided missiles.

(h) After Sales Service

As a result of success in selling the F 27, it was necessary to organise an after sales service. In addition to providing service to the aviation companies, this department also undertakes research into aircraft maintenance. The sale of spare parts is accounting for a steadily increasing share of business, even in the case of Fokker.

4. International links

A minority of the share capital of Fokker (20 per cent of the ordinary and 32 per cent of the preference shares) has been sold to the Northrop Corporation of Beverley Hills in the United States of America.

As a result of share transfers a complete merger with the S.A. Belge de Constructions Aéronautiques in Haren, Belgium occurred recently.

The purpose of such participations and mergers is the development of scientific knowledge and reciprocal participation in certain specialised sections or production programmes.

In addition to this direct form of co-operation by means of participation and mergers, there are other forms of co-operation with foreign firms:

- co-operation with Rolls Royce for the F 27 and F 28 engines;
- co-operation with Hamburger Flugzeugbau GmbH of Hamburg, the Vereinigte Flugtechnische Werke GmbH of Bremen, and Short Brothers and Harland Limited of Belfast for the building of the F 28.
- building of F 27 fuselages (100 thus far) and tail units by the French aircraft manufacturers, Breguet;
- the production under licence and sale of 166 F 27 Friendships by the Fairchild Hiller Corporation;
- the participation by Fokker in the development and production of foreign factories as mentioned in the preceding paragraph;

the agreement with Indonesia regarding the building of an aircraft factory there, etc.

5. Government assistance

Government assistance to the aircraft industry chiefly consists of "support" in the development costs of individual projects.

An example of this is the assistance provided in 1964 by the Dutch Government in connection with the development of the F 28.

The plans for this project were submitted to the Dutch Institute for Aircraft

Development, which was set up under the auspices of the Government and acts in an advisory capacity in cases of applications for subsidies.

Such advice is mainly concerned with the acceptability of the risk. Projects submitted are therefore considered from this point of view as well as on their technical and commercial merits.

Since the Institute's decision was favourable, the Dutch Government decided to provide 50 per cent of the cost of the Dutch participation in the F 28 project. The remaining 50 per cent had to be found from the stock exchange, though mostly under government guarantee.

This money can only be refunded in proportion to the number of final products sold, but no refund needs to be made in respect of the first 25 aircraft sold.

Even after pronouncing in favour of the subsidy, the Institute remains at the disposal of the industry for technical and scientific advice.

The industry can also call upon the National Aviation and Space Research Centre for assistance in technical and scientific matters.

6. Fluctuation in percentage of employment capacity

A distinction should be made between:

1. fluctuation in total employment in the industry and
2. fluctuation in employment according to department.

A great many of the problems in connection with the adaptation of workers to rapid technical and economic changes arise from the fluctuations in employment which occur as a result of such changes. The measures adopted by the industry to overcome fluctuations in employment are therefore of considerable interest for this seminar. In this connection it should be pointed out, as an advantage from the workers' point of view, that the measures adopted by the industry in order to distribute the financial risk also have a stabilising effect on the employment situation.

The Dutch aircraft industry proceeds as follows:

(a) In the first place, several projects are dealt with at a time, care being taken that, as far as possible, no single project is entrusted exclusively to one firm. This makes it possible to spread the fluctuations connected with the projects over a period, and to reduce the effect on the overall employment situation in the industry of fluctuations in the volume of work on each individual project or subproject.

The Dutch aircraft industry, therefore, does its utmost to participate in the projects of foreign aircraft industries and to get them to take an interest in its projects. In addition, the Dutch industry does not attempt to produce certain components, such as motors, which can be purchased abroad. Agreements are concluded with some suppliers of such components whereby they undertake to share in the risk of financing the project by providing the said components.

(b) Once some idea of the volume of work over the coming accounting period has been obtained as a result of the measures taken under (a) above, capacity planning is undertaken. Capacity is deliberately determined in such a way that any remaining peaks of work fall outside it.

The remark in the opening paragraph that the Dutch aircraft industry consists almost exclusively of Fokker and Aviolanda, with a total of about 6,100 workers, is therefore not true in every respect. Branches of firms not forming part of the aircraft industry, such as Philips, Werkspoor, 't Hart and Son, Backer and Rueb, etc., are regularly concerned with aircraft production, in cases where the productive capacity of the aircraft industry proper is temporarily inadequate.

In the same way, the Dutch aircraft industry co-operates with foreign aircraft manufacturers. For instance the French firm Breguet temporarily produced tail units for the F 27.

Once the Starfighter production programme had been completed, these tail units were again produced in the firm's own factory at Dordrecht.

(c) Insofar as the measures adopted under (a) and (b) still leave changes in the employment situation per branch, an attempt is made to provide staff capable of carrying out more than one job, if possible in more than one branch of the firm. Here, a leading part is played by the firm's personnel department.

Apart from the contribution of these measures towards making the Dutch aircraft industry as viable eocnomically as those of other countries, the result thus far has been that we have not experienced redundancy or shorter working hours on account of temporary reductions in production.

After a period of about ten years, during which the number employed in the industry was doubled, there was a fall-off in the increase of productive capacity owing to difficulties connected with the shortage of skilled labour.

It is apparent from the description of the production programme given in paragraphs 3 (f) and (g) above that the Dutch aircraft industry is adapting itself to the manufacture of products not directly connected with aircraft production. But it is also clear that many of these products have to be manufactured by the use of the same skills as are employed in the production of aircraft. Naturally, this diversification provides a welcome opportunity for stabilising employment. However, any extension of these activities comes up against the labour shortage difficulty already mentioned; but in cases where this production is particularly successful, the possibility of setting up specialised departments exists. These departments then lead a more or less separate existence with their own varying levels of employment. In some cases this may even be the occasion for taking the entire productive process away from the aircraft industry and incorporating it into another, separate undertaking. This, for example, could well be the case with the experimental production of panels for housing in the plastics division of Fokker. If production of these panels on a commercial basis is found possible, Fokker is considering putting it in a separate undertaking.

7. Dependence on exports and thus on politics

Although the situation outlined in paragraph 6 may be considered as very satisfactory for the Dutch aircraft industry, it should be noted that the measures mentioned can only achieve maximum success in an expanding industry.

Since the level of employment in the Dutch aircraft industry depends on the existence of opportunities for export and the possibility of participation in international programmes, the solution of the relevant political problems is a necessary prerequisite for the satisfactory solution of problems connected with the adaptation of workers to rapid technical and economic changes, even in the future. The political problems chiefly requiring attention in this connection are:

1. Governmental co-operation in drawing up international programmes for the development and production of aircraft;
2. the establishment of a European aviation policy, enabling European aviation to make up the leeway which separates it from more highly integrated areas such as the United States of America;
3. the holding of international conferences in connection with the financing of export credits. The trade unions which include workers in the Dutch aircraft industry also include those in the shipbuilding industry. They have seen the granting of export credits converted into a significant instrument of international obstruction in the shipbuilding industry and fear that aircraft exports will undergo a similar development.

8. The Labour Market

The adaptation of the number of workers to modifications in the level of production can be ensured in two ways; either by the recruitment of workers from outside the industry or dismissal of those already in it, or by transfers within the undertakings, superfluous workers in one division being used to fill vacancies in others.

The first type of movement occurs on what we call the "external labour market" and the second on the internal one. The present paragraph deals mainly with the external labour market, particularly with the way conditions governing this market influence the internal labour market.

If the labour market is defined as the market on which workers can change their jobs without the need for special retraining, the 6,000 odd workers in the aircraft industry constitute only a small percentage of the total number of workers available on this market.

As stated in paragraph 2, the Dutch aircraft industry is distributed among five locations. The already small number of workers is therefore scattered, so that work in the aircraft industry is not the main type of employment in any one of these places. The situation varies according to location and skill. For a number of years there has been a considerable shortage of workers in the aircraft industry, which has specific effects on the internal labour market of the aircraft manufacturing firms. We shall therefore now deal with the present situation, which is dominated by a shortage of labour, and the situation as it would be if the supply of labour were sufficient.

A. External labour market with a shortage of labour

In the situation of acute scarcity of labour which has lasted for years, the aircraft industry has had to compete for labour with other branches of industry. The scarcity of manpower, particularly in such a labour intensive branch as the aircraft industry, has considerable repercussions on the possibility of increasing production. The industry is attempting to overcome this difficulty by:

(a) Making use of staff on loan from other undertakings for jobs where possible (administrative, drawing office). In cases where such staff comes from firms which regularly loan staff this sometimes gives rise to friction with the firm's own staff;

(b) Recruiting workers from the Dutch Antilles, Belgium, Turkey, etc., which aggravates the already difficult housing problem;

(c) Setting up branches in places where the housing problem is not so acute. Thus, Fokker has transferred a section of its construction office from Amsterdam, where there is a considerable housing shortage, to Zwijndrecht. The merger of Fokker with the Belgian S.A.B.C.A. has also contributed to increasing the labour potential.

But these measures have not been sufficient to relieve the existing shortage, and the manpower situation has shown a tendency to deteriorate over the past few years.

The fact that under these circumstances it has not been possible to meet temporary peaks in employment within the industry needs no further explanation.

The converse, however, is true - that temporary reductions in employment have been absorbed within the industry.

The Dutch worker is very much attached to continuity of employment, and often prefers such continuity to the possibility of higher wages. The Dutch aircraft industry must therefore attempt to deal with temporary surpluses of labour by internal transfers. However, if the workers concerned have to seek work on the external labour market - and therefore outside the aircraft industry - most of them will never return to the industry. Under these circumstances, the idea of "temporary dismissals" simply does not exist. A worker who once leaves the industry leaves it for good. The measures referred to in paragraph 6 for spreading the risk and stabilising the level of employment are therefore also made necessary by the rigidity of the external labour market.

B. Plentiful supply of labour on the external labour market

Although, in view of the existing scarcity of labour, this is a purely hypothetical case, the purpose of this paragraph is to draw attention to certain facts which might well become important if there were no longer a labour shortage.

Except in the case of an extensive reduction in the level of employment, the measures listed in paragraph 6 for spreading the risk and stabilising the level of employment would also be applicable if the supply of labour were plentiful. The Dutch worker, therefore, need not be unduly apprehensive about "temporary dismissals on account of a temporary reduction in the level of production"; even if there is a more plentiful supply of labour.

In this connection, it is also worth noting that skills learned within the firm are liable either to be lost or to be used by other firms.

From the point of view of profitability, therefore, there are ample grounds for assuming that a more plentiful supply of labour will not lead to an increase of temporary dismissals in the industry.

In the case of temporary reductions in the level of employment, the industry has at its disposal another method of adapting its labour force without resorting to dismissals - the introduction of shorter working hours.

Under certain conditions and with the authorisation of the competent authorities the industry can go on to short-time working. Authorisation is not as a rule given for a working week of less than 24 hours. The workers concerned receive normal wages for the hours actually worked, while for those not worked they receive 80 per cent of the normal wage in "waiting money" and unemployment pay. By bringing their influence to bear on the employers, the trade unions can ensure that the "waiting money" is made up to 100 per cent of normal earnings. Owing to the part played by the trade union movement in the implementation of the legislation regarding waiting money and unemployment pay, it is possible to ensure that, under certain conditions, the employers' contribution is not deducted from the waiting money.

Although in most cases this method ensures that earnings remain practically stable in the event of short-time working, it is not entirely favourable to the worker, since he is entitled to draw waiting money for a maximum period of 26 weeks in the case of dismissal or a maximum of 26 times 45 hours in the case of short-time working. If the period of short-time working is not followed by one of normal working but by dismissal, the worker has already used up a proportion of the maximum waiting money to which he is entitled. This shortens the period during which he is entitled to draw waiting money while looking for new employment. Thus, short-time working is only favourable to the worker if there is a real chance that, during the period when his 26 x 45 hours are made up, the level of employment is restored and he can once again begin working a full week. Should dismissal be inevitable, the worker is better off if he is dismissed without a previous period of short-time working. This gives him the maximum amount of waiting money while looking for other employment.

In the case of dismissal, the waiting period is followed by a period of two years during which the unemployed worker is paid 75 per cent of his previous earnings from the unemployment insurance fund. Although this makes his income only slightly lower than during the waiting period, his situation is much more unfavourable, for benefits are suspended if the worker is not prepared to accept a job which the official employment service considers suitable for him.

It was stated above that the Dutch worker sets great store by continuity of employment. Since a request for approval of short-time working by the workers is regarded as a sign that business is going badly, the firm cannot make much use of this expedient if labour is in short supply. It is only when there is a plentiful supply of labour that there is no danger of workers who are on short-time looking for employment elsewhere, and it is therefore only in this case that employers can use this expedient.

The geographical dispersion of the aircraft industry and the fact that it constitutes only a small sector of the local labour market in each location are therefore important. The possibility of finding new employment is improved by the fact that little or no geographical mobility is demanded of workers.

In addition, workers can obtain information from the National Employment Service regarding the reimbursement of removal costs if they are unable to find suitable employment in their place of residence. The Employment Service also provides facilities for re-training for other jobs. During the re-training period, the same financial conditions apply as in the case of waiting money and unemployment benefits described above.

Working conditions in the aircraft industry are governed by a collective agreement covering the entire metal industry, so that, for the most important factors, such as wages, working hours, holidays, and so on, workers are not required to adapt themselves to other working conditions on changing jobs.

The worker has therefore every possibility of finding alternative employment, and the industry must pursue a policy based on the retention of its personnel.

9. The Internal Labour Market

The retention of personnel is therefore the most important task where the internal labour market is concerned. When the level of employment drops in one department, the personnel department takes the following action:

(a) finds similar work in another department;

(b) if necessary, finds less suitable work in other departments;

(c) places workers on a waiting list; non-working hours are then spent in the firm's canteen;

(d) transfer to short-time working;

(e) dismissal.

Remarks on the above:

(a) In practice, finding similar work does not always mean finding a precisely similar job, but one of the same classification. Workers should therefore preferably be able to take on more than one sort of job. This is the responsibility of management, as described in the following paragraph.

(b) If no similar work is available and the worker is directed to a job in a lower category, this gives rise to a wage problem. A worker who, as a result of a fall in the level of employment, is directed to a job in a lower category, retains his former wages. He is then paid at a higher rate than the other workers doing the same job, which may cause ill-feeling, while the newcomer is conscious that he is doing a less-skilled job without knowing how long the situation will last.

(c) The period spent in the canteen ought not to last too long or occur too frequently as it will have a psychological effect on the worker, similar to that in the case of short-time working.

(d)/(e) The effects of short-time working and dismissal have already been fully discussed. The emplcyer must have the authorisation of the employment service for both.

The cases most frequently reported are (a) and (b); an essential prerequisite for their success is a varied production programme, which the Dutch aircraft industry has thus far succeeded in maintaining satisfactorily. Another prerequisite is that the worker should be able to undertake more than one sort of job. This also serves another purpose.

The aircraft industry is characterised by what is known in the Netherlands as an "engineering climate", which means that, as a result of far-reaching technical preparation, the method of execution of work is prescribed down to the last detail. The amount of margin of discretion allowed to those who have to execute it is therefore very small.

There is no possibility for considerable groups of workers using personal initiative, particularly on the production lines, and this is considered to be monotonous.

In order to counteract this, workers are wherever possible trained for more than one job, so that their work is less monotonous. This, however, is dependent on the previous specialisation in cases where a man performed only one task or at most individual parts of a task. The task includes a number of operations. "Homogeneous production teams" (teams made completely responsible for the execution of certain subsidiary tasks) have been organised in some departments, particularly the plating department.

To do so it was necessary to obtain the agreement of the more skilled workers for less skilled workers to work side by side with them, and vice versa.

10. Vocational Training

The purpose of vocational training is twofold:

1. to ensure that workers keep pace with technical progress;

2. to increase the workers' versatility, e.g. to combine the skills of fitter and assembly-worker.

(a) Basic Training

The most frequent type of preliminary training is that provided by the LTS (Lower Technical School) and the UTS (Continuation Technical School). The various branches of industry have their own advanced technical training, which usually follows on the LTS.

The technical training which is most significant for the aircraft industry is provided by the Institute for Vocational Training in the Metal and Electrical Industries (Bemetal) and the Institute for the Promotion of Technical Training in Electronics (VEV).

This type of training institute is jointly managed by the employers' federations and the trade unions. The institutes lay down examination standards in close consultation with the industries concerned, and the examinations are supervised and/or conducted by persons designated by the trade unions. This form of training is subsidised by the Government.

Young workers can conclude training agreements with their employers in respect of such vocational training.

The most important Bemetal and VEV training courses for the aircraft industry are, on the basis of an LTS Diploma:

Bemetal:	aircraft bench plate worker, machine bench worker, turner, milling-machine operator, aircraft-model maker (wood);
VEV:	aircraft electrician.

These training courses are given in a separate trade school. Theoretical subjects are also taught during the daytime, and thus during working hours. Industry may provide the training schools with practical work in the form of productive tasks. Once the trainee has received his diploma, he passes a certain amount of time in each department of the factory in accordance with a programme.

Training courses last two years. At the end of them, between 40 and 50 per cent of trainees remain with the firm which provided the training. The standard of training is good, and that of the examinations high, so that during the training period trainees have to make considerable demands on their intellectual capacity, wheras subsequently they can only work in a routine fashion.

(b) Training according to function

Here, we are concerned with the imparting of skills or knowledge required for the execution of specific jobs - plate worker, assembly worker, upholsterer, jig-drilling machine operator, painter, riveter, etc..

Participants do not usually require previous training or experience in the job to be learnt. Thus, in the Fokker Company, horticultural workers, hairdressers and bakers have been trained in this way.

Instructors are selected from the firm's own personnel and trained. In the Fokker Company it is a general principle that a man must serve as an instructor in his speciality before being appointed foreman.

Once the course has been completed, the examination is conducted by a committee consisting of members of the factory staff with whom the candidates will have to work (production managers, foremen, supervisors, etc).

(c) Prototype Training

These training courses are necessary before new prototypes are brought into production. Participants are designated by the organisers of the course and are obliged to follow it.

(d) Continuation Training

These courses are voluntary. Admission to them is confined to workers who hold the Bemetal Diploma, or have undergone functional training followed by a year's practical experience. Training is given on a number of evenings per week over a period of from 8 to 9 months. The subjects taught include draughtsmanship, plate work and assembly. These courses can also be taken in combination with functional training by those who wish to change their job.

(e) Staff Training

This course is intended for supervisory staff, such as foremen, supervisors, technical instructors, group leaders, etc.. Courses mainly consist of discussions and are designed to bring out the best features of the staff concerned. The various training courses in a given occupation are complementary. The result is a cogent system with a number of possible entries independent of previous training (LTS, Bemetel, or VEV, for example).

Apart from the Bemetel and VEV courses, there is no age limit on admission to training.

Training courses essential for the execution of the work upon which the worker is engaged are compulsory, and are given either during working hours or in the evenings, in which latter case the time is paid at normal working rates.

Training within the firm which is not strictly necessary for the execution of the work, but designed to improve the candidate's chances of promotion, is given outside working hours. Trainees who pursue such courses successfully are repaid part of the costs involved by the firm.

UNITED KINGDOM

by H. Scanlon,
Executive Councilman,
Amalgamated Engineering Union, T.U.C.

The aircraft industry embodies a basic dilemma. In one sense it is exactly the sort of industry on which Great Britain ought to concentrate. It has a high proportion of value added, or a high conversion ratio. Its products contain relatively little imported material and most of the value of the finished article is derived from the work carried out in British factories by our main national asset, highly skilled and trained manpower. On the other hand, aircraft overheads in the form of development and initial production costs are high and rising all the time in relation to variable production costs, so that unit costs are crucially dependent on the size of the market.

This is the reason why the United States of America is able to dominate world aircraft production and sales and it puts the United Kingdom and other Western countries at a serious disadvantage. United States purchases account for about 75 per cent of free world military and space purchases and about 50 per cent of world civil aircraft purchases. The United Kingdom and the E.E.C. countries together only buy one quarter as much as the United States. At the same time the United States accounts for 80 per cent of world production and some 60 per cent to 70 per cent of world exports.

The results of this dominance can be seen in the relative length of production runs. For aircraft first introduced into service between 1955 and 1961, the average length run in the United States was three times the United Kingdom's for military aircraft - 530 as compared with 177, and 4 1/2 times for civil aircraft - 320 compared with 68.

The Plowden Committee set up to investigate the United Kingdom industry reported that in spite of this enormous cost disadvantage there was still a case for some domestic aircraft production capacity in the United Kingdom. Their case was based on four main grounds:-

1. The needs of defence. Although there was no longer an overwhelming defence argument for producing all the aircraft needed for defence - none the less it was worth paying something more in order not to be entirely dependent on foreign sources of supply.

2. Technological Fall-out. A technologically based advanced industry like the aircraft industry throws up scientific and engineering discoveries which can be used throughout industry generally.

3. There are obvious dangers of creating a monopoly position abroad.

4. There is the need to save foreign currency - with the balance of payments difficulty likely to be present for some time to come, a pound of foreign currency is still worth rather more than a pound of domestic currency.

The committee recognised that though these arguments established quite a convincing case for the continuation of the aircraft industry they did not establish the case for any scale of aircraft activity at any cost.

They suggested that the United Kingdom should no longer try to compete in the areas where it was at the greatest cost disadvantage, as is the case with large complex aircraft. It was in this field that the ratio of overhead to production costs was at its most crippling. For example the American F 111 is to cost just over £2 million compared with something like £5 to £6 million which would have been the cost of the United Kingdom equivalent, the TSR.2

It was through the cancellation of the TSR.2, involving the loss of jobs for work-people, that many of the problems faced by the trade unions in the United Kingdom aircraft industry were highlighted. And if the main recommendations of the Plowden Committee are implemented, and there seems to be good evidence to suggest that this will indeed be the case, employment in the industry is likely to contract still further.

The General Conclusions of the Plowden Committee are quoted below not only because of their relevance to the situation existing in the United Kingdom but because the arguments on which they are based are very relevant to the aircraft industry in Europe as a whole, and there cannot be much doubt that any further rationalisation of production that involves European co-operation must affect employment prospects over a much wider field than the United Kingdom. The latest estimate by the United Kingdom Government is that the present workforce in the United Kingdom aircraft industries of about 250,000 will fall to not more than 200,000 by 1970.

General Conclusions of the Plowden Committee

"The picture presented in this report is of an industry in difficulties. The basic problem is that the British home market is small and does not call for the volume of production needed to bear the high initial costs of developing and producing aircraft. Because of this, the industry finds it difficult to compete with the United States industry on costs. In recent years the Government has supported the industry by paying relatively high prices for British military aircraft and by contributing to the development of civil aircraft. The Government is now finding the price of British military aircraft disproportionately high and, in some cases, is seeking cheaper alternatives abroad. Thus the industry faces competition even in the hitherto sheltered home military market, which is the greater part of its total market. On top of the basic problem, there have been shortcomings in handling aircraft matters in Government and in industry.

There is no predestined place for an aircraft industry in Britain. The economic justification for the industry receiving more Government support than other industries must rest on whether it provides particular benefits to the country. There are such benefits: to defence policy, technology, and the balance of payments. But the present degree of support is already higher than these benefits justify, and in future the value of the benefits seems likely to decrease. We consider, therefore, that the Government should adopt policies which will lead to paying relatively less in future for the aircraft it buys, and should be more discriminating in the assistance given to civil aircraft development.

The industry must adapt itself to this reduced level of support. The difficulties of adaptation, though arduous, can and must be overcome. Many of them are difficulties which, in a somewhat less acute form, face all technologically advanced industries in this country. Indeed, the aircraft industry may be conceived as today embodying the predicament, as it has long embodied the aspirations, of the United Kingdom in the world. If the aircraft industry's problems are not solved, they will simply have to be tackled again elsewhere, while in the meantime the nation will have lost much.

The main policies we recommend to deal with the problems confronting the industry are:-

(a) Wholehearted collaboration on a comprehensive range of civil and military aircraft projects with European countries, with the aim of evolving a European industry to produce aircraft fully competitive with those from the United States.

(b) Concentration on projects for which development costs are not disproportionate in relation to the market.

(c) Purchase from the United States in cases where the requirement at (b) cannot be met by a European project. The Committee believe that this will mean meeting from American sources any future requirements for the largest and most complex weapon systems.

(d) A sustained drive to increase exports.

(e) Overhaul and improvement of the machinery in Government and industry for making and selling aircraft.

(f) Purchase by the Government of a financial share in the airframe companies in order to engage the Government more directly in the industry's affairs while at the same time enabling the existing duplicated system of control which impedes efficiency to be removed.

The industry faces a tremendous challenge. Radical changes of outlook will be needed for it to adjust to these policies. Ultimately the survival of the industry will depend on the success with which it does so.

The difficulties, though great, are not insurmountable. We believe that the future for the industry lies in a recognition of some overwhelming economic realities on the one hand and an imaginative and wholehearted collaboration with Europe on the other. If the policies we recommend are implemented with vigour and determination the industry should emerge smaller but stronger, and make a valuable contribution not only to the British but to the European economy.

1965 has been for the industry a year of uncertainty and difficulty. Many issues have had to await the defence review and our report. Early decisions are now needed as a foundation for future plans. We trust that the Government will make these decisions as soon as possible."

It was the announcement of the cancellation of the TSR.2 in April, 1965, motivated no doubt by the philosophy outlined in the Plowden Report, though the Report had not at that time been published, involving the loss of jobs of some thousands of workers which brought the British Trade Union Movement up against the problem of large scale redundancy.

Although there had been some large redundancies in various industries prior to the announcement, these had usually been the result in general of a falling off in demand for a particular product. These forms of contraction are often looked upon as the result of some impersonal market forces at work against which the individual is somewhat powerless, and therefore not in a position to oppose. The TSR.2 cancellation, motivated by these same market forces,came about because of, and was seen to be the result of, a direct and conscious decision of Government. This was quite a substantial psychological blow to the workers in the industry, especially as the decision was made by a Government with whom they had a community of interests.

There was obviously a division of interests here on the part of both workers and the Trade Unions concerned - on the one hand the need to protect their own sectional interests and the other to conform to the decisions of a government they considered to be their own. In the event the trade unions and the T.U.C., and to a somewhat lesser extent the workers themselves, reconciled their conflicting interests and accepted with more or less good grace the inevitable. Whether or not they would have accepted a similar decision by a Conservative Government so readily may now be of only academic interest and any speculation must involve a good deal of subjectivity, but it would seem that one of the most influential factors determining trade union thinking on the issue was undoubtedly the need not to embarrass maliciously a government sympathetic to their interests and newly elected after 13 years in the wilderness.

This is not to say that strong protests were not made, on the contrary there were many, especially by the workers most directly concerned - for instance, those employed by the British Aircraft Corporation and the Hawker Siddeley Group. Prior to the announcement of the cancellation of the TSR.2 it had been widely rumoured that the Government was seriously considering such action. Early in 1965 the Government announced the cancellation of the Hawker P1154 supersonic vertical take-off and landing fighter and the Hawker Siddeley HS-681 short take-off and landing. As a result of the announcement of these cancellations and the rumour of the intended cancellation of the TSR.2 ten thousand aircraft employees staged a protest march in London on 14th January, with one deputation being received by the Minister of Aviation and another calling at 10 Downing St., the official residence of the Prime Minister. Both the Confederation of Shipbuilding and Engineering Unions and the Trades Union Congress Economic Committee had separate meetings with Mr. Jenkins, the Minister of Aviation, in the same month.

As one of the workers' leaders at factory level said at the time, "After a lot of consideration given on whether to fight the decision we reluctantly decided to accept the position. We were agreed that we could fight individual employers with some hope of success but history had taught us that it would be foolish to pit ourselves against the Government, particularly as the Trade Unions individually and the T.U.C. appeared to be supporting Government attitude".

Having rejected direct action as a means of fighting redundancy the shop stewards took the only logical corollary to their decision, they set themselves the task of gaining the best possible deal for their fellow workers who were being forced to leave the industry.

The latest figures of the number of redundancies in the aircraft industry show that 8,226 workers lost their jobs in 1965. It is of interest here to note that Hawker Siddeley announced on 3rd February, 1965, that as a result of the cancellation of the P1154 and the HS-681 alone it would lay off about 14,000 out of the total labour force of 40,000, a number much in excess of the final outcome. This is a good example of the sort of pressure being brought to bear on the Government during this period - and it was, in the opinion of many, an attempt to use the workers militancy and fears to influence government policy by the employers and vested interests.

Perhaps the major feature of these latest redundancies in the Aircraft Industry has been the implementation of the provisions of the Redundancy Payments Act. In fact it would not be too extreme to say that without the tax free cash payments payable under the new redundancy scheme the whole operation would never have been carried out with the good will that eventually prevailed on both sides of the industry.

Everything that follows in this paper must be considered in the light of this underlying fact; it was in effect the oil that lubricated the whole process of redundancy, and without this oil much friction would have been generated which might have brought the whole operation to a standstill. And it is not beyond the bounds of imagination to postulate that the Labour Government, with its tiny majority, might have been brought down in the process, in spite of the desire of the unions to offer protection.

The main provisions of the Redundancy Payments Act which came into force on 6th December, 1965, are as set out in Appendix A.

The reasoning behind the Redundancy Payments Scheme is a recognition that a worker has some form of property rights in his job and that if he loses his job through no fault of his own he is entitled to compensation for the loss of that job in just the same way as an owner of property is compensated, in the form of a cash payment.

It was argued at the time that this type of redundancy payment, though no doubt justifiable in the interests of labour mobility, was not very relevant in social terms on the following grounds:-

(1) If a man loses his job the extremity of his situation is not determined by the length of time he has worked in that particular job but is related to his responsibilities and commitments outside the firm; on circumstances wholly unrelated to his workplace, i.e. his family responsibilities, the extent to which his particular skill, if any, is transferable, how mobile he is etc.

(2) Because the payment was seen as compensation for a lost job a worker over the age of 65 would receive nothing under the Act and those approaching the age of 65 would have the payment reduced to the amount they could have expected to receive in wages in their particular job up to the age of 65.

(3) Under the Act the entitlement to cash payment is calculated from the earnings of a worker during the period of four weeks ending with the last complete week before the notice was given. Now it is quite likely that prior to any redundancies there will be a period of run-down during which pieceworkers, especially, will be working at somewhat less than their normal rate, and therefore their earnings will be something lower than normal. This was so during the TSR. 2 redundancy which meant that these workers were paid less than they might have been paid had the period of calculation been extended to include a period of normal working.

(4) On a "last in first out" basis which usually applies in any United Kingdom redundancy it is usually those with short service who are involved. Under the Act those with less than two years' service are not entitled to any payment at all - it is not until a worker has a reasonable period of service of five years or more that the amounts become anywhere near substantial.

These are very real criticisms of the new scheme, in the absence of realistic social security benefits.

A different approach to the social problems created by redundancy is illustrated by an agreement reached in 1964 by the Draftsmen's and Allied Technicians Association and other unions, on the one hand, and Rolls Royce Ltd. on the other. (Appendix B)

This agreement was signed before the Redundancy Payments Scheme came into operation and must therefore be looked at in this light, but there would seem to be no intrinsic reason why similar agreements should not be reached with other employers to operate concurrently with the Government Scheme.

We are however being rapidly overtaken by events in Great Britain. There is good reason to expect that before very long there will be introduced a wage related system of unemployment and social security benefits, which will go a long way to meet some of the objections to the Redundancy Scheme put forward earlier. (Appendix C)

These new benefits together with the taxfree cash payments on redundancy and other state assistance to workers moving to new areas in search of jobs should remove most of the barriers to mobility, also the majority of the social and financial difficulties now present during redundancy.

The Redundancy Act fulfilled its intended purpose, however, in the case of the 1965 Aircraft redundancies. Not only were those declared redundant with any length of service willing to go, but many workers whose jobs were secure actually volunteered to leave the industry. This proved to be an embarrassment to the managements of the two large companies most intimately concerned - one of these firms saw the dangers early and managed to avoid ending up with an unbalanced labour force, the other it seems was not so successful.

It is of some interest to contrast the attitudes of the workers in these two large companies. Faced with precisely the same problem their separate approaches were quite different. How far their individual approaches were conditioned by past relationships with their employers is difficult to judge, but it seems that one set of workers had confidence in management motives, the other did not. Perhaps this is a too simple answer, and one that does not take into account the relative degree of militancy of the two groups.

Selection of employees to be dismissed

The companies, no less than their employees, were very concerned as to the method used to select those due to be made redundant. The unions tried to insist on the "first in last out" (FILO) principle on an occupational basis. This, however, conflicted with the need of the employers to maintain a balanced labour force in each of their various departments. For in the Aircraft Industry, unlike some other industries, production is organised on the batch system, and departments have been built up around this method of work, with workpeople absorbing skills that are to some extent, at least in the opinion of the employers, non-transferable.

At the same time it is quite possible for some departments to be over-engaged in production on components to be used in all the various aircraft being manufactured by the group, whilst some specialist departments feel the effects of a cancellation of a particular product immediately.

The companies method of reasoning was accepted by the unions at B.A.C. and dismissals took place on a departmental basis, but in the Hawker Siddeley factory at Bristol the unions insisted on redundancies being declared on an occupational basis.

In spite of strong opposition from management the unions at Bristol virtually took command of the situation. Insisting from the very outset that the problem could be dealt with by the voluntary movement of labour, they organised the necessary machinery to ensure the smooth operation of their policy. The machinery took the following form:-

(1) A committee of 42 delegates from the Bristol group of factories was established.

(2) From this committee a negotiating committee of 12 men was set up.

(3) A four man committee to deal with the Ministry of Labour and to keep contact with Members of Parliament and other bodies.

(4) A publicity committee to disseminate information to the workpeople largely through an almost daily news sheet.

Detailed and prolonged meetings with management were held to resolve the numerous details necessary for the voluntary system to function efficiently. In the early stages progress was impeded by lack of information on severance pay details and on the numbers involved in various occupations and departments.

Quite strict control was exercised over overtime working. Overtime working was a source of friction in both companies - for as stated earlier the latest system of production often means uneven development of productive capacity so that some departments may need to work overtime whilst others have a surplus of labour. At Bristol the unions insisted on the implementation of the full working week spread where necessary over seven working days. Where the company wished to introduce overtime working in any department they were required to prove their case to the 12 man negotiating committee. Dispensations were only granted after a full assessment of the labour and work situation had been made.

The voluntary system was subject to three reviews during the period of its operation. In the first of this series the company's assessment of the situation was opposed by the unions. The unions had predicted the movement of labour, based on earlier results, in a graphic form which proved to be substantially correct, and the company eventually had to agree that the statistics provided by the unions were more reliable than their own. It was quite clear in fact that the 12 man negotiating committee had a far clearer picture of the movement of labour and the impact of the voluntary system than the management.

The voluntary system could not have worked of course, without the Redundancy Payments Scheme providing the inducement to individuals to find alternative employment. Instead of individuals being named, the surplus labour was identified by the company on an occupational and departmental basis. Those wishing to avail themselves of the system indicated to management that they wished to be made redundant. Thus no one was forced to leave the company against his or her will.

It became necessary after the first two weeks to establish with the agreement of the company, a central union control to deal with the numerous queries from members. This involved the manning throughout the day of a stewards room normally used for meetings.

The insistence on redundancies being declared on an occupational basis meant that there was an imbalance in the labour force in some departments. After some discussion with the company agreement was reached on a voluntary method of transfer from those departments with more workers than they needed to the departments where labour was short. In spite of the above mentioned obstacles to the transfer of workers the system, by and large, was successful though there were some re-training difficulties in transferring from one department to another.

At B.A.C., Preston, the unions were more aware, or perhaps more sympathetically inclined, to managements' problems consequent on an imbalanced labour force and as a result only about 50 per cent of those that left were volunteers as opposed to virtually 100 per cent at Hawker Siddeley, Bristol.

Sub-Contract Work

Where possible all sub-contract work was brought back to the companies. This had the effect of reducing the numbers declared redundant since the number of sub-contractors, in the case of one company, was 160. This of course shifted the burden on to the sub-contractor to a greater or lesser extent, but because the sub-contractors were generally not solely reliant on the TSR.2 contract or even aircraft work in general, no particular problems seem to have arisen. The same is true of the many more suppliers of equipment to the companies - though affected, they were able to cope without undue difficulty.

Transfer to other jobs

Where possible workers at the main contractors were transferred to other projects - this involved some downgrading, where it was acceptable. At the Weybridge factory of B.A.C. most of the redundant TSR.2 workers were absorbed on work on the VC.10 and VC.111 aircraft brought in to the area from other factories of the group. This solution was not possible in most other instances however. In the Preston area it was possible to transfer some workers to the Lightning programme and others back to the English Electric Company to work on diesel engines. The Preston factory was originally owned by English Electric (English Electric is part of the same group as B.A.C.) and part of it is still used by them for manufacturing diesel engines. Those workers transferred to English Electric, though quite few, were made redundant by B.A.C. and thereby obtained in some cases quite a substantial sum of money in severance pay.

Training and re-training programmes

In view of the expressed opinion of the Minister of Aviation that the industries' labour force will fall by at least 50,000 by 1970 - a view that is in line with the recommendation of the Plowden Committee - the industry's problems for the future are not likely to include the training of new entrants or even retraining the present workforce, but rather the reduction of the labour force with the least amount of disruption. Perhaps natural wastage and retirements will assist in a solution.

The industry has always had a good record in the field of training - the apprentice training schools of both the large airframe companies have been models of their kind. Vast sums of money have been expended and are likely to continue to be spent once the proper size of the industry is determined.

With the advent of the Industrial Training Act, Industrial Training Boards have been set up to ensure not only that the right kind of training takes place but that the cost of such training is spread fairly over industry as a whole.

The main practical aim of the Act is to ensure that every firm in the main industries of Britain does its bit or pays its share in the training of skilled manpower. The Minister of Labour has set up a Central Training Council of eminent representatives of employers, organised labour and educational people: this council will lay down broad lines of policy. For each definable industry there are then to be established training boards, each empowered to levy money on the firms in that industry, and to spend it either on running training establishments or on reimbursing those firms that already do their fair share of training. The central government will pay for administrative expenses in the first year of a board's operation and various other initial expenses. The work of these boards is to be guided by the newly created Manpower Research Unit in the Ministry of Labour, whose job is to estimate the future demand for certain skills.

There is thus one body, quite independent of industry, with powers to ensure that the various firms in that industry train people in the right amounts and with the right skills required for the future.

Government Training Centres

One singularly important part of the industrial training process represented by the more than thirty Government Training Centres is at present outside the scope of the industrial training boards themselves. The function of the Boards at the present is to train new teenage entrants to an industry. But the business of retraining older workers, already in employment in a declining industry, remains with the Government Training Centres, a charge on the General Exchequer and run by the Ministry of Labour. These centres, first set up in 1919 to look after old soldiers, have never quite got clear of their origins. The Conservative Government in its last couple of years of office finally, after a series of ups and downs, decided to press ahead with expansion of these centres.

There are 30 Government Training Centres now open with almost 6,000 training places. The Minister announced last summer that he proposed to increase the number of places to 8,000 by providing eight more centres and expanding the facilities at existing ones.

Courses at these centres are provided in 40 different trades, the majority falling in the construction and engineering industries in which there is a shortage of skilled labour. The Ministry has had long experience of training as it has been providing training courses for almost 40 years. During that time it has developed a system of training - accelerated vocational training - which is unique in this country. The method involves short full-time highly intensive training courses.

Most of the courses last for six months. A few are longer, but none exceed 12 months. In that time the basic skills of a trade are taught. The training emphasis is on the practical side and on the actual work carried out in the trade; theory is restricted to the necessary minimum. Classes are small - from 8 - 16 trainees - to ensure that each man receives individual attention. The centres are well equipped with up to date machines and tools.

Towards the end of a course, placing officers at each centre assist trainees to obtain employment. About 95 per cent of men trained in a Government Training Centre area find employment in their new trade.

Anyone over 18 who is either unskilled or who has poor prospects of finding a job to suit his abilities can apply for a place in a training centre. The selection of individuals is usually by panels including representatives of employers and trade unions.

The training is free and taxfree allowances are also paid. For example, a single man living at home receives £8 per week; a married man with one child £11 a week. Free credits are given for national insurance contributions, and daily travelling expenses are paid if the journey to the centre is more than two miles each way.

If a man has to leave home to take training then he is accommodated either in a hostel attached to the centre or given a lodging allowance. Assistance is also usually provided towards fares home, and there are paid holidays during a course. At the end of a course if a personal tool kit is usual in the man's new trade, for example as a plumber, this is provided free.

At present about 54 per cent of the training places in Government Training Centres are provided in engineering and allied trades and 35 per cent in the construction industry. But Government Training Centres still suffer from suspicion by trade unionists who fear "dilution" of their craft. It is highly desirable that their work should be more fully integrated into the work of the Industrial Training Boards. Not only will the boards have money that could push them ahead, but the fact that the boards will be manned by top trade unionists as well as by employers should then open the employment field far more widely for men trained at them.

A modern industrial country needs a large output of well educated people who because of their high standards will be able to pick up a skill in a relatively short time and pick up yet another skill when their first has been made obsolete by technical progress.

The Industrial Training Boards are well aware of their responsibilities and there are signs that in Great Britain we are at last beginning to move away from the old ideas of the apprenticeship system, largely because it has become apparent that the old apprenticeship system cannot provide skilled people with the necessary speed and flexibility, nor in sufficient numbers to meet the requirements of a new technology. We are at last coming round to the idea that the business of learning a life-long skill, as something quite apart from the business of learning about life and techniques through education, is not conducive to a rapid rate of economic growth.

Last in First out (LIFO) principle

Whenever redundancy is mooted in Great Britain trade unions have always insisted that selection of those to lose their jobs, wherever such a choice exists, shall be on the LIFO principle. It is said that this satisfies the unions' sense of fair play, and prevents managements from victimising certain individuals. But does it not just represent the easy answer; the easy way out of a very difficult problem?

Simple principles which can be applied with justice often bring in their wake their own injustices. For example the application of the LIFO principle may produce a class of worker, who, if he is unfortunate enough to be involved in several redundancies, may never build up enough service in a particular firm to escape this principle. It may also inhibit mobility - for a worker will not wish to lose his security brought about by his long service in his old job by moving to a new. It might also not be in the long term interests of the long service worker should his job at last disappear, for he will then be forced onto the market at a time when his age will be an extra obstacle to finding employment - it might have been better for him to have left earlier rather than have been protected by LIFO.

It is not easy to suggest an alternative to LIFO. But there is some evidence from studies of various redundancies to suggest that support for LIFO is not as widespread as sometimes supposed and that perhaps some form of points system should be introduced to give weight to other considerations besides length of service - such as time-keeping, skill, good workmanship, family responsibilities, etc.

This proposal may not be acceptable to all, but what is clear is that we should give much more thought to the consequences of the LIFO principle and whatever principle or principles we put in its place.

Programmes for the Re-Location of Manpower

Just over 8,000 workers in the aircraft industry were made redundant during 1965. By February, 1966, only 248 were still registered at the Ministry of Labour as unemployed. This shows the extent to which the surplus manpower was absorbed by the rest of industry.

Quite a lot of credit for this must go to the Ministry of Labour and the aircraft manufacturers concerned. From the very outset the companies showed great concern for the welfare of their employees. During the period of rundown those due for dismissal were given time off with pay to seek other work and to be interviewed by prospective employers.

Accommodation was made available for any employer wishing to interview prospective employees and many workers found similar work quite close to home, e.g. in Preston the local companies include a number of commercial vehicle manufacturers, switch gear makers, plastic and chemical machinery divisions of the Atomic Energy Authority and United Glass Ltd. Most of the local firms employed some extra workers and Leyland Motors took considerably more than most.

The Ministry of Labour set up site offices on the premises of the larger firms and interviews took place during working hours to offer alternative employment to those leaving the various firms. Of the 8,226 declared redundant around 5,000 registered and of the 5,000, 1,596 were placed in employment by Ministry officials. Another 2,199 registrants were known to have found work on their own accord. Of the 3,795 known by the Ministry to have found work, the following table gives an analysis of their dispersal:-

1. In Aircraft Industry	
(a) In own occupation	594
(b) In other occupations	131
2. In Associated Industries	
(a) In own occupation	1,262
(b) In other occupations	693
3. In other Industries	
(a) In own occupation	589
(b) In other occupations	526
	3,795

Note: Associated Industries include engineering, electrical, shipbuilders, etc.

It is reasonable to assume that the remainder of those declared redundant, i.e. 4,431 found employment in the various industries in at least similar proportion to those shown in the above table. If this is so then over 5,000 of the 8,226 found alternative work in their own occupations, and over 1,500 were retained in the aircraft industry itself.

In percentage terms the latest information is that 19 per cent were re-employed in the aircraft industry, 52 per cent went into metal using industries, other than aircraft, and 29 per cent into other industries.

It was not considered necessary by either the industry or the Government to introduce any special facility to re-locate manpower. (See Appendix D) It was thought that the existing facilities would suffice given the prevailing labour market situation. The Government did, however, try to co-ordinate the efforts of the aircraft companies concerned with those of industries seeking labour; companies from as far away as Scotland made inquiries about the availability of the redundant workers. The central organisation set up to match labour supply and demand found that practically its sole function became one of placating irate employers who had been promised much wanted additions to their labour force; additions in many cases that failed to materialise.

Quite a number of workers took advantage, however, of the existing facilities to assist transferred workers. The Minister of Labour has power under the Employment and Training Act, 1948, to make loans and grants to workers moving from one area to another in Great Britain for the purpose of obtaining employment. The powers are used to make available (a) loans by way of advance for fares for journeys to employment, and (b) grants and allowances (under the Ministry's Transfer Schemes) to assist workers who take employment beyond daily travelling distance of their homes.

Resettlement Transfer Scheme

This scheme is primarily to assist unemployed workers with poor employment prospects in their home areas to move to jobs in other areas either for the purpose of resettling permanently in the new areas or until such time as work may be available for them nearer their homes. It also applies to unemployed persons who are going to fill key posts (which cannot be filled by local labour) in new factories which are being established in areas of high unemployment, and who undertake to resettle permanently in the new areas. Assistance, which includes free and assisted fares, lodging allowances and, for those transferring permanently to the new areas, payment of household removal, is available up to two years from the date of transfer.

The Older Worker

Whilst redundancy in the prevailing industrial climate has not assumed the proportions feared when first sprung upon the aircraft industry, it would be wrong to conclude that there were not some workers to whom redundancy is or could be a major catastrophe.

In particular there are the workers in the age group 50-65. Theirs is a problem to which, up to date, we in Great Britain have failed to give sufficient thought, let alone attention.

No doubt there is much that can be done in the way of early retirement pensions; this was done in the case of workers nearing retirement age in the aircraft industry. Wage related unemployment benefits too will go a long way to easing the financial burden of the older unemployed worker. But these cannot meet all the social problems. Many men in their late fifties and early sixties are just not ready for retirement; they need the stimulation of work no less than the incomes they derive from such work.

The subject of changing occupation and job in middle age is becoming one of increasing practical importance especially as very few young people starting work today can hope to do the job for which they initially trained until they retire. Constantly changing requirements of a scientific and technologically based society will mean that a growing proportion of workers made redundant by technical progress will need to learn new skills during their working life.

With the supply of labour being reduced at one end by the tendency for young people to stay at school longer and to continue full time education after normal school leaving age, coupled with the reluctance of higher educated people to take traditional skilled, but manual jobs in industry it is likely that industry will have to rely more and more on retraining semi-skilled workers normally considered to be above the age for training.

There seems to be a very real reluctance on the part of employers generally, however, to recruit and retrain the older worker. Though many employers pay tribute to their conscientiousness, loyalty and good time-keeping there are very few instances where employers have set out to provide good training schemes for the middle aged.

The Government Training Centres in Great Britain in April, 1965, were training only 179 persons over the age of 45, this was a 63 per cent acceptance rate of the number of applications. Officers of the Ministry of Labour have now been instructed to pay special attention to the need to recruit more people over the age of 45. But the centres can only train quite a small number of people; the main responsibility for training or retraining these people must fall upon the employers themselves, and we can only hope that the Industrial Training Boards will do more to encourage such firms to inaugurate special training and retraining schemes to suit the needs of the middle aged.

Conversion of Facilities to New Uses

At the time of writing none of the major aircraft firms has converted aircraft facilities to other uses within recent times. This applies to Hawker Siddeley, Aviation, British Aircraft Corporation and Short Bros. and Harland.

Hawker Siddeley have a fair amount of aircraft work to keep them going at present. Their policy has been to dispose of factories when there is no aircraft work available, rather than to convert them to other uses.

B.A.C. are also disposing of factories they no longer require - one at Luton to General Motors and one at Cardiff to Bristol Siddeley. Their guided weapons division already handles a diversity of other work but this has not involved the transfer of aircraft facilities.

The future of Short Bros. is under urgent consideration by the Government. The company has had a number of non aircraft lines of work for many years. In the near future, especially in view of the recommendation of the Plowden Committee,they will face a major problem in determining what to do with their existing aircraft production and assembly hangers, which are particularly suited to the construction of large aircraft.

Recognising that Shorts posed a particular problem,situated as it is in Northern Ireland with its relatively high rate of unemployment,the Department of Economic Affairs some time ago got an American firm of consultants to examine ways and means of switching the company on to wider engineering work. Although the report of the consultants has not yet been published there is reason to believe that a major diversification effort by Shorts is recommended.

Over half of Short's shares are owned by the British Government. Concern for its future, which had been mounting, developed further when the Plowden Committee recommended that "no exceptional measures of support should be given". The directors of the company have stated that in default of new orders the number employed might have to be reduced from some 8,500 to about 4,000. The Minister of Aviation has stated that on the basis of present orders and workload (H.O.C. 11.5.66) he estimates that the number employed on aircraft construction and missile work by Short Bros. in December, 1966, will be about 6,000 and about 3,500 in December, 1967.

Pointing out that the Skyvan freighter and guided missiles hold the key to the future of the group's aircraft division, the Little report recommends diversification along two main lines. In the first place it is suggested that Shorts should undertake as many joint ventures as possible with other companies. Secondly, the companies are urged to develop further into the fields of mechanical and material handling into which first steps have already been taken. The precision engineering potential that the group have already established provides a base from which this diversification could develop.

The consultants recognise that Shorts have been hampered in previous development efforts by a shortage of capital. They also agree with the view already expressed by the Government that Shorts should not be provided with a subsidy from public money. Rather, the report emphasises, although work may be needed for 4,000 to 5,000 workers, all new projects must be commercially viable.

Talks are now proceeding between the Minister of Aviation and the heads of the aircraft industry on the main recommendation of Plowden - that Britain should have just one big manufacturer. Both the large firms have accepted, it seems, the logic of the situation; the struggle now centres on who is going to come out on top.

The two contenders are B.A.C. and Hawker Siddeley; B.A.C. is owned by English Electric and Vickers, each with 40 per cent and Bristol Aeroplane which holds the remaining 20 per cent. Just over half of Hawker's interests are outside aviation. The extent to which diversification takes place will depend, of course, upon which of the two giants dominate the new company.

With Vickers at the start of a new diversification programme of its own it will need to know whether they will be keeping its 40 per cent stake in B.A.C. The signs are that the Government will buy out Vickers and the other major B.A.C. partner, English Electric, and merge it with Hawker Siddeley. This, however is conjecture and may well be subverted by fact by the time this paper is published.

But with the future so uncertain it is understandable that possible diversification or relocation is also very uncertain.

Long-term Prospects

The industry is likely to find the going even tougher from now on. Defence spending will no doubt rise gradually with national product. No doubt too, the industry will continue to get a substantial part, but, with the onset of "cost efficiency" evaluation methods, more may be spent on foreign aircraft and the proportion devoted to home produced aircraft may fall.

The civil side illustrates well the mistakes and the problems of the industry. The United Kingdom can offer aircraft to cover virtually every type of usage. Unfortunately, the evidence is still that none of them is fully competitive with the United States equivalents, and overseas orders have been very hard to come by.

Gradually the industry has lost its technological lead. In airframe construction the United States industry is almost certainly ahead. In engines there is perhaps now little in it, but previous sales increases were built on a long lead in jet and turbo-prop types. The only major area where we are still demonstrably ahead, that of vertical-take off types, is unfortunately at present in eclipse. The consequence of this relative slide is that sales prospects for the future must be correspondingly dimmed. Concord looks like a last brave (many have said foolhardy) attempt to remain in the big league.

Nevertheless there remains a place for the industry provided it exploits its natural advantage of lower labour costs. This means that the industry is likely to concentrate on more specialised types, which would have too small a potential market and too low a breakeven point to justify United States' interest. This points to more emphasis on market research and less on technological breakthroughs. And further links with leading European manufacturers should lead to economies in development and somewhat larger, though still not massive, potential markets. Such a future, while less exciting, could be more profitable, less wasteful of the country's scarce skilled manpower and will probably be actively encouraged by the more pragmatic political leaders, who have now emerged. It is likely to entail some further, but perhaps not too drastic, contraction in employment and output.

A further natural development would be diversification by the major manufacturers. This would be into areas where some of the technology used in aircraft construction could be usefully employed. Most already have interests in other fields, such as hovercraft, hydrofoil boats and electrical equipment of various kinds and these are likely to be extended.

For the reasons given, viz: tight labour market, Redundancy Payments Act, Government assistance in matching workers to jobs etc., etc., the trade union movement does not envisage future difficulties and there is every reason to believe that the philosophy behind the concluding paragraph to Hilda Kahn's "Repercussions of Redundancy" is well on its way to becoming the accepted way of thought in Great Britain today.

"Redundancy is an issue where a balance has to be struck between the social and the economic good, for some redundancy is inevitable if the economy is not to stagnate. Hence it will not do to succumb either to the attractions of an 'economically hard', or to the blandishments of a 'socially soft', set of remedies. What is significant, however, is that while social and economic desiderata undoubtedly may pull in opposite directions, this is by no means invariably so. The subject of regional planning is a case in point; so is that of industrial training; and so is that of redundancy policy. In the latter sphere, should our twentieth-century wits enable us one day to eradicate the fear of redundancy, a substantial contribution will have been made alike to social and economic welfare. But only when we have evolved a multi-pronged comprehensive programme, adequately covering all aspects of the problem and generously protecting all those liable to be affected, can we reasonably expect a measure of tolerance from the potential victims of redundancy. Only then - and not because a particular set of major dismissals proved less grave in the event than was feared when they were first sprung upon the nation - are we entitled to view redundancy with something approaching equanimity."

APPENDIX A

REDUNDANCY PAYMENTS ACT

The Act requires employers to make lump-sum compensation payments, called "redundancy payments", to employees who are dismissed because of redundancy. It also requires these payments to be made in certain circumstances to employees who have been laid off or kept on short-time for a substantial period. The amount of the payments is to be related to pay, length of service with the employer and to age.

The Act also establishes a Redundancy Fund, financed by contributions collected with the employer's flat-rate National Insurance contribution. Employers who have to make redundancy payments as required by the Act may claim a rebate of part of the cost (ranging from two-thirds to just over three-quarters) from the Fund.

The Act provides for disputes about entitlement to redundancy payments or about claims for rebate from the Fund to be settled by Industrial Tribunals established under the Industrial Training Act, 1964.

The scale of payments

Years of service will count for payment as follows:

(1) For each year of employment between ages 18 and 21 inclusive - half a week's pay.
(2) For each year of employment between ages 22 and 40 inclusive - one week's pay.
(3) For each year of employment between ages 41 and 64 (59 for women) inclusive - one and a half week's pay.

Mr. Gunter, the Minister of Labour, pointed out during the debate on the Bill's second reading (April 26) that an "important by-product" of the introduction of the Fund would be that it would be necessary to ask employers to give notice of a claim on the Fund some time before the redundancies took place. This would mean in effect that employment exchanges would get advance notice of virtually all redundancies, and the Minister intended to see that "the utmost use is made of this to get ahead in good time with the placing of redundant workers in fresh employment or with arrangements for retraining where that is needed".

APPENDIX B

REDUNDANCY AGREEMENT AT ROLLS-ROYCE LTD.

One of the most vital aspects of the proposals concerned compensation and a scale of redundancy payment.

In most redundancy agreements both aspects apply, but it was recognised that on a "last in first out" basis those with short service would be involved and decided that it was better to concentrate on trying to obtain an agreement that would provide payment for as long as possible to those having difficulty in getting other work.

The unions agreed that their representatives should try to obtain:

(a) The longest possible period of notice which would give time for those redundant to try to find another job;

(b) Financial assistance if unemployed.

(c) A special lump sum payment to cover travelling and removal expenses for those who have to move to another area.

In short, assistance should be given where it was most needed and, recognising that the financial resources of a company which had to declare redundancy must be limited, it was felt that if they surrender all-round lump sum payments in order to obtain this cover, this would be the correct line to follow. The firm had already indicated that they were not unsympathetic to a settlement along these lines.

The agreement is printed in full. It is necessary to add a short explanation in connection with the section dealing with financial assistance while unemployed. Readers will also note the special provision within the agreement for appeals machinery. This is a very useful safeguard, readily accepted by both sides.

Financial assistance

The level of payment of one-third of a week's wage is determined by a most important factor. Government regulations limit the amount of compensation payment which may be received by an unemployed person if he is to be entitled to draw state unemployment benefit in addition. A supplementary payment of this kind must not exceed two-thirds of a normal week's pay, less the standard daily rate of unemployment benefit.

The decision to make the scale of assistance one-third of a week's wage was taken in order to ensure that this regulation would be met.

This will mean, in practice, that any person unemployed after being made redundant will receive payment from the company, from the state, and if eligible under the rules, unemployment benefit from the Association, all free of income tax.

In this way the company and the nation are bearing some responsibility, and it is right that they should do so.

REDUNDANCY AGREEMENT BETWEEN ROLLS-ROYCE, LIMITED
AND THE FOLLOWING STAFF UNIONS:-
D.A.T.A., A.S.C.W., C.A.W.U.

1. Definition

Redundancy is defined as occurring when there are surplus employees which the approved programme of work cannot support and the surplus has not been absorbed after all the following action has been taken.

2. Preliminary action

(a) Recruitment of new employees will cease in the occupational groups represented by the staff unions who are party to this agreement. In the event of redundancy being of a general character affecting all occupations, a general ban will be placed on recruitment. Exceptions will be discussed with the appropriate union.

(b) Any employee retained past the normal retiring age will be retired.

(c) All sub-contract work will be withdrawn subject to:

- (i) the Company's ability to perform the work or to manufacture the parts involved;
- (ii) the Company's ability to absorb the work without detriment to maintaining vital output.

(d) Overtime working will be terminated within occupational groups concerned. Any exceptions will be discussed with the appropriate union as being necessary to meet contract commitments or to provide essential services.

3. Selection of redundant personnel

All other things being equal:

(a) The "last in, first out" principle, based on length of continuous company service, will apply. Exceptions will be discussed with the union representatives concerned. Transfers will be effected on an occupational basis between departments within the group of factories concerned based on length of continuous company service. Surplus employees will also be given the opportunity to apply for any vacancies existing in other groups.

(b) Married women who have adequate means of support will be declared surplus before any other employees in any particular occupation.

4. General warning of redundancy

The longest possible warning of the numbers affected within a skill and occupation will be given and discussed with the union representatives concerned.

5. Individual warning and notice

Individual employees to be declared redundant will be given ten weeks' warning and at the end of this period four weeks' notice will be given to terminate employment.

During both periods every effort will be made to offer alternative employment within the company and it is expected that any reasonable alternative will be accepted. Whilst it is impossible to define precisely what would be a reasonable alternative it will generally be the type of work from and to which the employee could have been transferred in more normal circumstances. The refusal of an alternative job will automatically justify the offer being made to any other available employee with shorter service.

4

The refusal of a suitable alternative employment, not involving loss of earnings either prior to or during the warning and notice periods, will disqualify the individual concerned from receiving the benefit from any or all of the redundancy terms.

The unions will be given the names of all individuals involved at the time the warnings are issued.

6. Assistance during unemployment

Financial assistance will be given to a redundant employee who, immediately after leaving the company, is unable to obtain other employment as confirmed by the payment of National Insurance unemployment benefit.

Married women not paying into the unemployment benefit fund must provide some certificate that they have registered with the Ministry of Labour and are genuinely seeking work.

Any person who refuses alternative employment whilst unemployed, in such way as to be disqualified from receiving National Insurance unemployment benefit, will not qualify for further assistance from the company.

Financial assistance will be given at one-third of a week's basic salary per week while unemployed for a maximum period defined as follows:

(a) One week for each completed calendar month of service throughout the first twelve months of employment with the company.

(b) An additional two weeks for each subsequent complete year of continuous service.

(c) The period during which such financial support will be given will not exceed a total of twenty-eight weeks.

The amount of each payment is subject to Ministry of Labour regulations which limit the amount of assistance which may be received in addition to unemployment benefit. A supplement of this kind must not exceed two-thirds of normal week's pay less a single person's unemployment benefit. The payment will be adjusted so that the amount paid by the Ministry of Labour is not reduced.

7. Removal allowances

Forty pounds will be paid to any redundant staff employee who, having a dependent relative, is obliged within twenty-eight weeks of actually leaving the company to take employment more than twenty miles from his residence at the time of leaving. Evidence of establishment in new employment must be produced.

8. Holiday pay

Holiday pay based on service since the preceding July will be paid to those who have not had their annual holiday. For those entitled to more than two weeks' annual holiday this will be one-quarter of a week's salary for each completed month of service since July. Those entitled to two weeks will receive one-sixth of a week's salary for each completed month of service since July.

9. Appeals

Individuals have the right of appeal, either on the grounds of exceptional hardship or when it is alleged that the rules of selection have been broken. A successful appeal may necessitate the introduction of another name on the redundancy list. Union representation will be permitted.

10. Contracts

All contracts will be honoured but the extended warning and notice will not be given in addition to the termination of any contract for reasons of redundancy. The benefits of assistance during unemployment and the removal allowance will be applicable to former contract holders.

11. Retraining

Every effort will be made to retrain employees for alternative jobs.

12. Leave of absence for interviews

Employees who have been given formal warning of redundancy will be granted reasonable facilities to seek alternative employment outside the company.

13. Early release

Redundant employees will be allowed to take up alternative employment outside the company before the final discharge date. In such instances, although the employees will not qualify for the total of the redundancy conditions, their personal record will be endorsed "discharged as redundant".

14. Re-engagement

Employees who, having been declared redundant, are subsequently re-engaged by the company will be allowed to count service prior to the redundancy as continuous service for the purpose of entitlements relating to holidays, sickness and long service awards. Employees re-engaged under this scheme will be considered for further redundancy from the last date of starting.

15. Revision

These terms are applicable to employees with less than ten years' service and will be reviewed in the light of any new legislation on the subject.

APPENDIX C

EARNINGS-RELATED SUPPLEMENTS TO UNEMPLOYMENT AND SICKNESS BENEFITS

The additional benefits will take the form of earnings-related supplements payable to people over 18 and under minimum pensionable age provided that they are entitled to flat-rate unemployment or sickness benefit. The supplements will start from the thirteenth day of a period of interruption of employment and will last for up to a maximum of six months. Periods of unemployment or sickness not separated by more than 13 weeks will be treated as one period of interruption of employment, as under the present flat-rate scheme. The supplement will be one-third of the claimant's average weekly earnings between £9 and £30 and will be paid in addition to the existing unemployment and sickness benefits, including increases for dependants, subject to a maximum total benefit of 85 per cent of his earnings. This means that the maximum additional payment will be £7 (one-third of £21) for the claimant with average weekly earnings of £30.

Changes in graduated contributions under the national insurance scheme

At present graduated contributions, counting towards the graduated part of the national insurance retirement pension, are paid by employed persons over age 18 and their employers at the rate of 4 1/4 per cent on the employee's earnings between £9 and £18 a week; employees who are members of a recognised occupational pension scheme which provides pension benefits equivalent to the maximum payable under the graduated scheme can, however, be "contracted out" of the graduated scheme by their employer.

In order to provide for the extra cost to the National Insurance Fund of earnings-related supplements to unemployment and sickness benefit and of widow's supplementary allowance, the Bill proposes that additional graduated contributions should be paid at the rate of 1/2 per cent a side on that part of the employee's earnings which lies between £9 and £30 a week, which is the band of earnings on which the supplements are to be based. There will be no contracting out of the new scheme of earnings-related short-term benefits and the new 1/2 per cent graduated contribution will therefore be paid by those who are contracted out of the graduated pension scheme as well as by those who are not. Thus, persons not contracted out will pay a total graduated contribution of 4 3/4 per cent on that part of their earnings that lies between £9 and £18 a week and of 1/2 per cent on earnings over £18 and up to £30; in all cases there will be a matching contribution from the employer. Contracted-out persons and their employers will each pay the 1/2 per cent graduated contribution which will also count for graduated pension. There will be no changes in the flat-rate national insurance contributions.

APPENDIX D

GRANTS TO HELP LABOUR MOBILITY

Assisting workers to move to new jobs

In many industries technological developments are simultaneously creating new jobs, occupations and opportunities in some areas whilst reducing employment prospects and trades in other places. Consequently, labour mobility, with people being able to move to different areas to take advantage of new opportunities, is an essential requirement for a dynamic economy.

An obvious obstacle to labour mobility can be the financial cost of moving from one part of the country to another. Buying and selling a house, going into lodgings and at the same time providing a home elsewhere, visits home - all these expenses can deter people from moving and taking employment in a new locality. To help people meet these and other costs, the Ministry of Labour offers a variety of grants and allowances.

Widely used

The Resettlement Transfer Scheme is the most widely used scheme. This is to help people already unemployed, or those likely to become redundant within six months and unlikely to find suitable regular work near home but who have found work beyond daily travelling distance. Before giving help, the Ministry has to be satisfied that the new job offers prospects of resettlement and also that suitable people who are unemployed are not available already in the new area.

Key workers

The Key Workers Scheme provides grants for key workers who are moving to a project being established by their employers in a development district. The Ministry has to be satisfied that these workers are needed for the firm to become established in the new area. Approved key employees may receive a grant if they are being transferred on either a permanent or temporary basis.

The Nucleus Labour Force Scheme assists financially new employees of a newly established firm in an area of high unemployment to be temporarily transferred to their employer's parent factory for training.

The benefits under these three schemes are similar, except that help towards household removal is confined to where the move is expected to be permanent. The allowances include: fares to the new job, a settling-in grant of £5; weekly lodging allowances of £3.10. 0 for an employee in lodgings yet maintaining dependants at home; and financial assistance for up to six visits home a year.

Incidental expenses

When a worker has found a home in the new area for his family, their fares are paid together with removal costs and an incidental expenses grant of £30 is also given.

Employees buying or selling their houses receive three-quarters, up to a maximum of £120, towards legal and other ancillary costs.

Assistance under these schemes is available for a maximum of two years. The schemes apply only to jobs paying not more than £1,500 a year. The application of these schemes for assisting people to move is flexible; they are geared to meet the needs of individuals who are unemployed and to assist individual factories setting up in areas of high unemployment.

ELECTRONICS SECTOR WORKING FOR THE AIRCRAFT INDUSTRY

BELGIUM

by R. Javaux,
Secretary-General,
Centrale Chrétienne des
Métallurgistes de Belgique,
(C.S.C.B.)

I. The Belgian Electronics Industry

A. General Pattern

1. Types of production

In Belgium, as in most other Western European countries, the electronics industry is a relatively recently established industry. It was not until just after the war that electronics emerged from the laboratory stage to that of its industrial application, but, it has continued to expand and diversify its activities to the point where it is now subdivided into four branches, i.e.:

- spare parts or components;
- consumer durables, mainly radio and television sets;
- capital goods for industry - measurement and regulation systems, automation, telecommunications, medical appliances, nuclear energy equipment;
- military supplies - radar and navigational aids for aircraft, guided missiles and space travel.

In the Western European countries, the consumer durables sector still represents the major outlet for the electronics industry whereas, in the United States, by 1962 this sector represented only 15 per cent of total turnover, as compared with 57 per cent for defence purposes, 18 per cent on capital goods for industry and 10 per cent on spare parts.

It is not possible to give a precise breakdown between these four branches in Belgium, or even to determine the relative position of the electronics industry itself, because the latter is an integral part of the vast sector covered by the general heading of Electrical Engineering. Consequently, we have to fall back on mere estimates.

The Belgian electronics industry is dominated by two groups of products: consumer durables and telecommunications equipment. In recent years, however, most of the firms in this field have tended to diversify their production.

The steady growth of demand has enabled the Belgian electronics industry to finance investment and research in the more advanced fields of electronics, especially with regard to components such as transistors, diodes, resistances and printed circuits. Furthermore, firms which already had some experience of making electronic tubes for consumer goods have found it fairly easy to adapt to the growing demand for components in the industrial field, such as measuring and regulation systems and automation circuits.

Electronics equipment for defence purposes, has so far been of only minor importance in the Belgian electronics industry. Some firms have been involved in the execution of two large-scale European military projects: the Hawk guided missile and the Lockheed F 104G supersonic fighter aircraft. This kind of activity nevertheless constitutes a valuable source of experience capable of application to civilian use.

2. Number of firms

The Belgian Electrical Engineering industry comprises over 300 firms employing 5 or more workers. At the same time, it is a relatively concentrated sector, with 70 per cent of the total labour force being employed in only 8 firms of which the 3 largest account for more than half.

Number of workers in the major firms in the Electrical Engineering sector, December 1965

	Industrial workers	Technicians and Clerical workers	Industrial + Technicians and Clerical workers	
			Number	As a percentage of total for the industry
1. A.C.E.C.	10,200	4,500	14,700	21.8
2. Bell Telephone	9,400	2,650	12,050	17.9
3. Philips	6,900	2,900	9,800	14.5
4. M.B.L.E.	3,350	1,500	4,850	7.2
5. ATEA	1,400	650	2,050	3.0
6. Vinckier	1,250	300	1,550	2.3
7. Siemens	1,100	300	1,400	2.1
8. C.B.R.T.	1,050	150	1,200	1.8
Total for 8 firms only	34,650	12,950	47,600	70.6
Total for the industry	49,500	17,900	67,400	100

A survey carried out a few years ago by the National Institute of Statistics revealed that the 11 largest firms accounted for 75 per cent of the value added in the sector as a whole.

This degree of concentration is due not so much to the heavy capital investment required, as is the case in the Iron and Steel industry for instance, but rather to the necessity of maintaining large departments which are not directly productive, such as design and research services, laboratories and so on.

The smaller manufacturers are mainly specialised in limited fields where these ancillary departments are not such an essential feature, i.e. accumulator manufacturing, electrical repairs, wiring, etc.

An additional reason behind the concentrated pattern of production in the Electrical Engineering sector is the existence of numerous financial connections between different firms, either directly or through financial groups. These relationships extend beyond the national, or even the European boundaries of the industry.

B. Contribution to the National Economy

1. On the financial plane

In 1965, the turnover of the Electrical Engineering sector amounted to B.Fr.28 milliard, or roughly one-fifth of the turnover of the whole metals manufacturing industry.

The production of the Electrical Engineering sector is divided roughly as follows: 50 per cent electrical capital goods; 25 per cent consumer durables (other than radio and television sets); 25 per cent electronics goods. The foregoing is, of course, no more than an approximation; as we pointed out earlier, it is sometimes difficult to distinguish between the respective outputs of the Electrical Engineering and the Electronics branches.

On the above basis, it can be estimated that the turnover of the electronics industry, in 1965, amounted to B.Fr.7 milliard.

2. On the employment plane

As was shown in an earlier table, in December 1965 the Belgian Electrical Engineering industry employed 49,500 industrial workers and 17,900 technicians and clerical workers, giving a total labour force of 67,400. This represents 6 per cent of the labour force in the manufacturing industries as a whole, and 15 per cent of that engaged in the metallurgical industries (basic metallurgy and metals manufacturing combined). Out of the total of 67,400 workers, about 20,000 are employed in the electronics branch.

One of the main features of the labour force in the Electrical Engineering sector is the high proportion of female workers, who account for more than one-third of total employment in the sector. At the same time, however, the position in this respect varies considerably from one firm to another, as follows:

Firm	Percentage of female workers in industrial grades (1)
C.B.R.T.	71
Siemens	65
Philips	61
M.B.L.E.	58
Atea	42
Bell Telephone	38
Vinckier	21
A.C.E.C.	19

(1) At beginning of 1964.

The high proportion of female workers in the electrical industries is explained by the fact that many of the operations carried out require repeated manipulation. As these tasks are usually light ones which do not require a high degree of technical qualification, they are mostly performed by women workers because of their natural aptitude for work of this kind and, above all, because of the lower wage-rates they are paid.

Another special feature of the electrical industries' employment pattern is the high proportion of technicians and clerical workers, as compared with industrial grades.

The following table illustrates that this proportion is much higher in the electrical industries than in the other branches of the metallurgy sector.

Technicians and clerical workers employed in the various branches of the Metallurgy sector

	Technicians and Clerks as a percentage of total labour force
Iron and Steel	16
Non-ferrous Metals	17
Metals manufacturing industry (excluding electrical engineering)	19
Electrical Engineering	27

This situation is again explained by the nature of the work carried out in the electrical industries. The proportion of white-collar workers is a high one because the intricacy of electric and electronic machines and instruments requires the employment of large numbers of engineers and technicians, with large research services and laboratories.

As concerns the level of qualifications, it can be seen from the foregoing that the electrical industries including, and even principally, the electronics branch, employ highly-qualified personnel at the design and control stages of production, combined with unskilled workers at the shop-floor level.

Consequently, these industries employ fewer workers in the medium range of qualifications than is the general rule.

II. The labour problems which arose when a large order for aircraft was placed in Belgium in 1960

Whereas the Belgian aircraft industry is in the main directly under the influence of defence orders, the Belgian electronics industry engages - as we saw earlier - in a very wide range of activities which are quite unconnected with aeronautics.

As a means of illustrating the influence exercised by aircraft orders on the employment situation in the electronics branch, possibly the best way is to examine the effects of a large order for military aircraft which was executed over the period 1961-1965.

The order was in connection with the integrated construction, at European level, of F 104G fighter planes.

The F 104G fighter comprises 11 electronic systems covering a very wide cost range.

Belgium was allocated orders for 15 per cent of the electronic equipment.

The orders were placed directly with two firms: other firms handled certain items of work, but to a much lesser degree.

A. Recruiting and training of workers

FIRM No. 1

The first of the two firms was established primarily for the purpose of handling the electronic equipment required for the aircraft in question.

This firm took delivery of the equipment from the manufacturers and carried out the following procedures:

- reception testing

- laboratory testing
- fitting to aircraft
- in-flight trials.

Over the period 1961-1966, the pattern of the total labour force employed was as follows (yearly averages);

- early 1961: establishment of the firm
- 1962 : 290 employees
- 1963 : 340 "
- 1964 : 340 "
- 1965 : 290 "
- May 1966 : 310 "

Maximum establishment (end 1963/early 1964): 380

Minimum establishment (1965) : 270

Salaried workers accounted for one-fifth of the total establishment.

1. Initial handling of the order

The type of activity in which the firm was engaged obviously required highly-qualified personnel working in a very specialised field.

The academic training given to engineers and technicians and to skilled workers covers only a basic curriculum directed to radio and television techniques, and to some extent to industrial electronics but none at all to the more advanced techniques employed in the aircraft industry, such as Radar and so on. It was therefore immediately apparent that the personnel would have to be trained within the firm.

The following methods were adopted:

- The graduate engineers followed introductory courses under the direction of technical representatives from the manufacturing firms, supplementing these by personal study.

- The remaining personnel engaged on a permanent basis (i.e. technical engineers and technicians) were trained on the following lines:

(1) an initial elementary course;

(2) two or three months' training on the job;

(3) specialised courses conducted by the graduate engineers after the training described above.

- The shop-floor workers (welders, cablers and machine operators) were given:

(1) a period of on the job training;

(2) specialised courses.

In the case of an undertaking of this kind, constant attention must be paid to the training of new recruits, in view of the highly technical nature of the work involved.

Recruiting was organised as follows:

(a) Supervisory grades

As soon as the firm was constituted, it became necessary to recruit supervisory personnel of suitable quality and in sufficient numbers.

A hard core of qualified personnel was formed by some specialists provided by a Belgian aircraft manufacturer together with a number of technical assistants from the Hughes Aircraft Company. Other elements were recruited from outside. Recruiting took place on a country-wide scale, but most of the personnel engaged consisted of graduates.

(b) Shop-floor workers

Apart from the cablers, who were mainly recruited in other firms, the shop-floor workers engaged were mostly school-leavers or workers who already had a few years' experience in industry. Consequently, the shop-floor personnel consisted of young workers, most of whom had a trade qualification (A3).

2. Winding-up of work on the aircraft order

The fall in the number of persons employed recorded in 1965 (380-270) was due to the winding-up of the work in connection with the defence aircraft order placed in 1961 when the firm was first established.

This reduction took place in the following manner:

(1) voluntary departures; a large number of workers, knowing that the contract was due to expire, found employment elsewhere before being actually forced to do so;

(2) suspension of recruiting;

(3) dismissal of about 20 workers, many of whom were not suitable for work in this kind of establishment.

However, a large proportion of the personnel was kept on by the introduction of new activities.

In order to retain the services of the best workers, the Company started by launching research programmes based on the know-how acquired during the execution of the aircraft order. These programmes provided work for about 20 persons over a 10-month period.

The firm then reconverted a part of its activities to civilian requirements, especially towards the sale and subsequent manufacture under licence (at the same time endeavouring to go beyond the scope of the licences by introducing improvements) of electronic controls for machine-tools.

At the present time, the range of the firm's activities is as follows:

(A) In the aircraft field proper: manufacture and maintenance of electronic systems for aircraft.

(B) In the civilian field:

- numerical control of machine-tools;
- production regulation and control systems for various industrial applications;
- sale and manufacture of special switchgear for the European space industry;
- special sounding instruments for scientific experiments.

(C) Design and research concerning various items of equipment, including a Radar-control device and a number of industrial systems.

FIRM No. 2

1. Initial handling of the order

This firm employed 3,600 industrial grades and 1,400 technicians and administrative workers, giving a total establishment of some 5,000 persons.

About 310 persons had to be recruited in connection with the defence order, which was of some size and came at a time when the firm could already provide work for most of its permanent staff.

It should be noted that this firm was cautious in its application for a share in the work to be allocated between the various countries involved, in its desire to avoid having to engage too many extra workers who would become redundant once this particular order was completed. The firm's policy being never to dismiss its employees, it was careful to take on no more workers than it expected to be able to retain on a permanent basis.

Moreover, this firm wished to avoid becoming too highly specialised in the aircraft industry branch of electronics.

The qualifications of the personnel engaged were as follows:

Personnel engaged for executing the Lockheed F 104G contract.

Shop-floor workers	
Fitters	20
Toolmakers	5
Turners and millers	10
Cable fitters, male	55
female	55
Coil-winders, female	15
Skilled labourers, male	26
female	22
Qualified electricians (B2)	20
Junior supervisors	20
Qualified workers (A3-B3)	10
Technical and administrative staff	
Graduate engineers	2
Technical engineers (A1)	6
Chemical technicians (A2)	1
Laboratory assistants (Chem.)	2
Electronics technicians (A2/B2)	40
Charge-hands	15
Progress chasers	3
Rate-fixers	5
Typists	9

It should be noted that the technical engineers (A1) and the electronics technicians (A2/B2) had to follow special Radar courses arranged by the firm, as their main function was to carry out the assembly of the various components, to control their quality and then to effect trials on the finished items.

The remainder of the new recruits were treated in the same way as all new entrants to the firm - irrespective of the department to which they are posted - and given special training which was more in the way of an introduction to the work which it was intended they should perform. This training is given by instructors and is followed up by a period of actual working under the supervision of the works foremen. In other words, the personnel recruited for this particular order was given no special training. Indeed, the manufacture of electronic appliances does not require any special training. It is the function which is an electronic one.

2. Winding-up of the contract

In accordance with the firm's standard policy, the winding-up of the contract was not accompanied by any dismissals. There were a few voluntary departures, but barely more than in the normal course of events. In order to adapt the establishment to its reduced work commitments in the aircraft electronics field, the firm suspended all recruiting over a period and transferred some workers to its other factories in the Brussels area. These measures corresponded to the firm's normal personnel policy and were thus not specifically related to the contract in question. This way of dealing with the problem can, of course, only be applied in the case of a very large firm with a very wide range of production lines. This description applies to most of the firms who shared in the manufacture of the electronic equipment for the Lockheed fighter, as the following table shows:

Firm	Value of share in the contract (million B.Frs.)	Average number of workers employed on the contract over four years	Total labour force of the firm
Bell Telephone	200	200	11,500
A.C.E.C.	400	125	14,800
M.B.L.E.	1,000	310	5,000
O.I.P.	200	70	400
Total:	1,800	705	31,700

B. The part played by the Union Organisations

Just before the F 104G order was placed, the Union organisations, represented at the Conseil Professionnel du Métal, were informed of the benefits which it could bring to Belgian industry. In addition to representing a certain number of hours of work for a highly-qualified and extremely specialised section of the labour force, it was expected that this contract would enable the Belgian aircraft industry to become equipped and organised in a manner fitting it to play its full part in the European civilian aircraft industry. For the electronics industry, it would provide the opportunity to become acquainted with new techniques such as the use of magnesium, the manufacture of high-quality printed circuits and component miniaturisation.

The union organisations requested the appointment of a Joint Committee to supervise the financial control of the contract's execution and to study the lasting economic effects of the operation, but this was refused.

At individual firm level, the Union delegations and Works Committees were concerned in the vocational training arrangements made for the new recruits.

When the order was nearing completion, the union officials and the Works Committees in the firms concerned displayed their interest in the future of the workers who had been engaged specifically in connection with the contract. However, this problem turned out to be not a very serious one and it was settled without any major hardship.

At national level, the Unions requested the Conseil Professionnel du Métal to examine the social and economic difficulties which might arise when the contract work came to an end, and to study the extent to which a degree of reconversion of the factories concerned would be possible and desirable. This aspect of the matter, however, concerned mainly the aircraft industry proper.

III. Conclusions

The uneven incidence of aircraft contracts has little direct influence on the level of employment in the Belgian electronics industry, since most of the firms concerned are very large ones with a wide range of production in which electronic equipment for aircraft plays only a minor rôle.

Where these firms are concerned, the aircraft market is merely one amongst many.

However, the position is different in the case of a firm such as that described in our first example, i.e. one whose activity is directed mainly to electronic equipment for aircraft. For a firm of this kind, the fact that orders for aircraft are few and far between raises a serious problem of the quantity and quality of manpower. An attempt should therefore be made to achieve greater stability by measures to be taken by the Government authorities who place these orders and by the individual firms themselves.

The measures to be taken by the Government authorities should include medium- and long-range planning of orders as a means of regulating the level of activity in the aircraft industry. Furthermore, the national aircraft industry should receive compensation based on the number of hours of work it loses when Defence or Civil Aviation orders are placed abroad.

The measures to be applied by individual firms should consist basically of partial reconversion operations destined to counteract the irregular incidence of aircraft contracts by providing alternative activities. For further details on this subject, reference should be made to the Belgian report on the aircraft industry.

NETHERLANDS

by Dr. H.J.M. van Velthoven,
Economic Adviser,
Netherlands Metal Workers
Union. N.K.V.

INTRODUCTION

The lay-out of the present report on the Dutch Electronics Industry differs slightly from that of the questionnaire drawn up by the O.E.C.D. During the collection of data and talks with representatives of the industry, it became apparent that the questionnaire was not fully applicable to the situation in the Netherlands.

Nevertheless, a number of points mentioned in the questionnaire are dealt with, although sometimes in another connection and adapted to Dutch conditions.

Composition and location of the industry

Most of the Dutch electronics industry is concentrated in a few concerns which until recently were all part of the Philips Company, the headquarters of which is in Eindhoven. The electronics industry developed out of the electrical industry and is still closely bound up with it.

The firms with the most important electronics production are:

1. Philips Telecommunication Industry (P.T.I.):
   (a) at Hilversum (telephony - telegraphy)
   (b) at Huizen (radio - radar)
   (c) in The Hague
   (d) at Hoorn
2. Hollandse Signaal Apparaten N.V. at Hengelo (H.S.A.)
3. Van der Heem Electronics in The Hague (V.H.E.)

These three (plus the two following firms:

4. Machinefabriek of Alkmaar
5. Spoorwegsein-industrie of Culemborg)

together constitute a Philips combine, a so-called "main-industry-group", namely Telecommunication and Defence-systems, with a total payroll of about 10.000.

There are establishments of other concerns like I.B.M.; Siemens; Ericson etc. but they are not working for the aircraft industry.

Production programme

Below is a list of the production of the firms mentioned which is destined for the aircraft industry and for aviation. Other production, for telephony, telegraphy, television, etc., is not taken into consideration.

Only a small, though variable, proportion of total production is destined for the aircraft industry proper. A far larger proportion is for aviation purposes in the broader sense. Activities in connection with space research have been undertaken recently.

The European Launcher Development Organisation (E.L.D.O.) project is significant for the P.T.I. and the V.H.E. V.H.E. makes the measuring, control and regulating devices and thus the data communication for the second stage of the rocket.

P.T.I. in Huizen provides the telemetry-equipment for the third stage and the telemetry receiving station.

In addition to these electronic products, which are of a highly complicated nature, there is a large production run of many more conventional products.

DESTINATION PRODUCTS	Aircraft industry	Aviation	Space research
P.T.I.			
broadcasting	x	x	x
radio-communication	x	x	
mobile radio		x	
radar	x	x	
data-communication		x	x
telemetry equipment			x
H.S.A.			
radar fire-control systems	x		
aerial defence systems		x	
automatic air traffic control		x	
all types of radar, data handling and data processing			
V.H.E.			
radio-communication	x	x	
tracking, control and recording apparatus (data communication)			x

Contracts are mainly related to the "professional sector", that is the techniques used are of an advanced kind, the products are brain-intensive and the contracts come mainly from the government, e.g. for defence and other public purposes.

As a result of the advanced nature of contracts orders may often:

(1) vary from large to very large contracts;

(2) imply individual manufacture or only very small runs.

The result is that many of these orders are placed on a "post-calculation" basis. In some cases they are placed on a "pre-calculation" basis with escape clauses covering unforeseeable rises in wage costs and the prices of raw materials, since many of these projects cover periods of several years.

A penalty clause for failure to respect the stipulated delivery date is also included in the contract.

The above production programme and the methods of production, require a high standard of skill from the personnel who, for this reason, as well as on account of considerations of political security, constitute selected groups who can be employed in almost every department of the works if required.

A high degree of internal mobility is considered to be an absolute essential.

Number employed

The following table, showing the number of workers employed in the various firms concerned as from 1950, will give some idea of the growth of the electronics industry:

TABLE 1

YEAR FIRM	1950	1955	1960	1965
Philips Telecomm. Ind.	4,100	6,350	5,350	6,700
Hollandse Signaal App.	950	1,700	1,800	3,000
Van der Heem Electr.	50	100	350	500
Total number of workers	5,100	8,150	7,500	10,200

The above figures reveal not only the growth of the industry, but also the fact that such growth has not been steady. In particular, the restrictions on expenditure introduced in 1958 had a considerable effect on the development of the industry.

The fact that the electronics industry generally employs highly skilled labour will appear from the following table, giving the total number of workers employed by the three concerns in 1965 according to categories:

TABLE 2

FIRMS CATEGORY OF EMPLOYEES	Total	P.T.I.	H.S.A.	V.H.E.
Unskilled workers	2,870	2,200	500	180
Skilled workers	2,100	1,000	900	200
Medium and highly skilled technicians	3,700	2,430	1,160	100
Engineers	130	70	40	20
Administrative staff	1,400	1,000	400	-
	10,200	6,700	3,000	500

Skilled workers are those who have been trained in a "lower technical school" in accordance with the apprenticeship system (see page 108 in this report).

Medium technicians are workers who have completed one or more industrial courses such as the medium or advanced electronics course.

Highly skilled technicians are those who have completed a course at a higher technical school, whether or not supplemented by courses within the firm.

Engineers and assimilated personnel are university graduates.

It is above all the group of medium and highly-skilled technicians which has increased considerably over the past five years.

The geographical dispersion of P.T.I., H.S.A., Van der Heem, and the four other firms forming part of the Philips combine among six localities is partly due to labour market considerations connected with the supply of unskilled workers. Machines are no substitute for unskilled workers in the small run production demanded by the "professional sector". The need for unskilled workers will largely continue as long as small run production exists.

Concentration in a single locality would undoubtedly give rise to labour supply difficulties.

Fluctuations in the Order Books

Contracts coming from the professional sector are very attractive from a purely commercial point of view, but nevertheless have certain disadvantages.

1. They may be so big that very often all available staff and resources must be mobilised to execute them within the specified time. They constitute enormous peaks in the production programme.
2. Contracts do not follow in regular succession. This is particularly true where, as a result of government measures of economy, contracts are deferred, with the result that peaks in the production programme are followed by recessions.

Effects on employment

In normal circumstances the result of these fluctuations would be that workers are taken on at peak periods and paid off during slack periods.

Extensive fluctuations in employment are to a large extent mitigated in the firms concerned by:

(a) the diversification of production programmes and putting work out to contract;

(b) the structural scarcity of labour;

(c) vocational training, extra-training and advanced training;

(d) sales policy.

(a) Diversification of the production programme

Although there are considerable fluctuations in the order situation, and therefore in manpower requirements, in the electronics industry such fluctuations have comparatively little effect on the level of employment. This is to a large extent explained by the nature of the firms concerned. The entire electronics industry in the Netherlands forms part of the Philips concern which, with its wide variety of electronic and electrical production, can more easily absorb fluctuations than can industries with a more specialised production programme.

The electronics industry, in addition to its more advanced programme, also deals with conventional products in the tele-communications sphere. During periods when there are extensive orders for the more advanced products, the production of conventional products is put out to contract. Putting work out to contract is nearly always a costly expedient, but it is the most effective means of dealing with production peaks. In fact, therefore, difficulties in connection with maintaining the level of employment are passed on to other firms.

(b) Structural scarcity of labour

A second factor for the stabilization of the level of employment is - and has been for some years - the scarcity of manpower in the Netherlands generally; this obliges firms to hold on to their personnel during slack periods, particularly their skilled and highly skilled workers. This ensures that, once production starts up again, firms do not have to start once again recruiting the workers who have been dismissed.

Another important consideration which is closely connected with point (c) (to be dealt with below) is that capital invested in the training of such skilled workers should pay dividends. If highly skilled workers drift away from the firm, the competing firms will benefit from the large amounts which the original firm has spent on their training and retraining.

An attempt is therefore made to retain the workers concerned during slack periods. For this purpose they are employed:

(1) on similar jobs on which they can employ their skills;

(2) on less suitable jobs but with entitlement to the same wages as they were earning originally;

(3) on short-time working, although with the normal number of working hours paid for. The authorisation of the Labour Inspectorate is required for this.

Should a large number of workers be affected, the Ministry of Social Affairs and Public Health often intervenes.

Should there be really serious difficulties, an attempt is made to place workers on "waiting pay".

Finally, there remains dismissal, but this means that the relation with the firm is broken.

If we consider the above from the point of view of the workers, in the majority of cases there will be a preference for the first three methods, since transferring to another job with another firm, above all if this means moving to another place of residence, implies looking for accommodation. With the housing shortage as it is, people are particularly bound to their place of residence.

The Government has not adopted, or even considered, any measures for reducing irregularity in the production programme. Involuntarily, it contributes to increasing the extent of the fluctuation.

(c) Vocational training, retraining and further training

Most of the workers taken on are in possession of a certificate from a lower technical school or a more comprehensive primary school. Thereafter begins their actual technical training, which usually takes place in the firm itself.

The various types of training referred to below are of the same level and form part of the apprenticeship system, under which an agreement is signed between the employer and the father or guardian of the apprentice.

Training is subsidised by the State. The various training courses are organised by:

(1) The Stichting Bedrijfsopleiding Metaal en Electrotechnische Industrie (Bemetel). This Institute was set up jointly by employers' and workers' organisation in the branch. Bemetel is also responsible for the supervision of training and the implementation of the provisions of the training agreement.

(2) The Vereniging tot bevordering van het Electrotechnische Vak Onderwijs in Nederland (V.E.V.).

(3) The Dr. A.F. Philips School in Hilversum.

All three of them provide training courses lasting two or three years, according to the level of previous training. The practical part is provided within the firms.

Once this training has been completed, those who have finished their courses are integrated into the production process. This does not imply that their training is completed. Workers are trained as fitters by means of evening classes. They can also follow application courses enabling them to adapt their skill and knowledge to the latest technical development.

For a few years past there has been a clear shift in the direction of electronics. Evening classes in medium and advanced electronics are given on a continuous basis.

The application courses are organised as required. The same workers often follow more than one course. This contributes substantially to mobility within the firm, which is so essential in view of the production programme, and enables firms to take their own measures in connection with changes in the nature of jobs.

For the most highly skilled technicians and engineers, it should be pointed out that exchanges are made between scientific establishments of university level and the research departments of the firms concerned. On the one hand members of the works personnel are sent to universities and establishments of university level in order to specialise, while on the other hand specialists engaged in the firms' research departments are often encouraged to go and give lectures about their research at such educational establishments.

(d) Sales policy

A more psychologically orientated sector of industrial policy is concerned with the ways and means of obtaining the large industrial orders in individual cases. Decisions on delivery dates and the conditions under which orders are placed are of direct interest for the level of employment and the composition of the labour force, for the execution of individual manufactures largely depends on the skills available among the labour force.

Such execution is also partly dependent on the extent to which the necessary skills and knowledge can be imparted or obtained.

We shall not go into further details on this point, since it constitutes one of the most complicated aspects of the industry, particularly for the layman. Moreover, it is clear that the industrial situation is dependent on a number of factors, by no means the least of which is the situation of competitors.

Summary

In conclusion, it may be affirmed that the Dutch electronics industry is growing rapidly, that there is a distinct tendency to shift from conventional electricity to electronics and that this shift is of a structural nature. This is a result of technical developments, and in the Netherlands it can be compensated for by the organisation of training courses in the firms concerned in accordance with the skills available among the labour force.

Fluctuations in production as a result of the irregularity of industrial orders have led to the necessity for considerable internal mobility, which again can be ensured by means of training and retraining within the firm. Next, putting out conventional production to contract at peak periods of specialised production appears to be an inevitable link in the adaptation process, which makes it possible to limit the effects of fluctuation.

Thus, fluctuationsin the number of orders has until now caused no need for excessive geographical mobility. This is limited to a large extent by the structural scarcity of labour and the housing shortage. Nevertheless, large fluctuations in the use of plant capacity, due to the number and size orders, may give rise to more considerable geographical mobility in the future.

UNITED KINGDOM

SOURCES OR CAUSES OF CHANGE IN LOCATION, SIZE AND NATURE OF MANPOWER REQUIREMENTS IN THE ELECTRONIC SECTOR WORKING FOR THE AIRCRAFT INDUSTRY

by T. A. Breakell,
Executive Councillor,
Electrical Trades Union, T.U.C.

Introduction

Before attempting to appreciate an analysis of the manpower requirements (location, size and occupational adjustment) in the aircraft and electronics industries, it is necessary to appraise their dependence both upon one another and upon government policies in the civil and military fields. Both industries are deeply involved in the development and application of avionics and devote a substantial proportion of their manpower to this technology. The employment and utilisation of manpower in government establishments, however, cannot be disregarded in any consideration of total employment in the whole avionics field.

Interdependence of the Industries

The development of both the aircraft and electronics industries began at about the same time, both being emergent industries within the last fifty years. While the electronics industry developed as an extension of the parent electrical industry, itself an emergent industry at that time, it was basically a new technology so far as commercial application was concerned and found its earliest expression in the field of radio. Until the Second World War, radio was virtually the electronics industry.

Although their early association was not particularly close, aviation and electronics have shown concurrent development; their enormous expansion in the last thirty years is mainly attributable to their mutual interaction. The requirements of aviation have placed demands upon the inventiveness of electronics while the achievements of the latter have shown the way to greater advances and developments in aviation.

The use of electronic techniques has made a valuable contribution to the development of both civil and military aviation, neither of which could exist in its present form or have attained its present efficiency without electronics. At the same time, the electronics industry has derived substantial benefit from the considerable research and development undertaken in the field of avionics, partly sponsored by government and assisted by the various government establishments engaged in research and development.

During the Second World War, high and urgent demands were placed upon both industries in the face of the national emergency, and under their stimulus scientific and technical developments proceeded apace, so that by the end of the war a great variety of technologies had been translated into hardware. With the return to peace-time conditions, and some relaxation of security, it became possible to apply much of this development to civil purposes.

While the development of the aircraft industry has extended into sonic and aerospace projects, the electronic industry, with the advent of even more sophisticated techniques and equipment, has found a wide range of interests and activities in all spheres of industry and services. At the same time, both industries have maintained their close co-operation in the field of avionics.

Since the war, military applications of radar and navigational aids have been extended to early warning systems, guidance of missiles, etc., while civil applications have also grown rapidly in air traffic control, airborne and marine radar and navigational systems. The extent and importance of avionics is indicated by the fact that this group of products is the largest single group of electronic capital goods in both the United Kingdom and the United States.

Industries' dependence on Government.

The aviation industry has benefited considerably from defence programmes; the military need for higher speeds, longer range and larger pay-loads has resulted in engine and air-frame developments of immense importance to civil aviation. There is no doubt, however, that by far the greatest range of technical fall-out to civil industry has come in the electronics field. For example, one of the very urgent needs of the defence programme was to reduce the minimum size of the many electronic devices used in aircraft, guided missiles and rockets of all kinds. Experiments for this purpose led to miniaturisation by means of printed circuits and transistors. Both, in their modern form and application, must be regarded as the logical development to commercial ends of work done under the defence programme.

Alongside its responsibilities in the civil aviation field, and its sponsorship of the aircraft and electronics industry, the Ministry of Aviation is vitally concerned with the research and development, supply of aircraft, guided weapons and electronic equipment to the Armed Forces. The Ministry's scientists and technologists play an important advisory role in the formulation of operational requirements in these fields. The concentration of the Ministry's research effort is in its R. & D. establishments which play an essential part in the Ministry's own contribution and in the development projects carried out by industry.

Of a total of 3,000 qualified scientists and technologists employed by the Ministry of Aviation, some 2,000 are working at the seven main R. & D. establishments. These establishments account for approximately one-fifth of the annual expenditure of the Ministry for research and development purposes, in administration. About two-thirds of this running cost are devoted to monitoring, supporting and testing the development work carried out under contract in industry.

By far the largest of the R. & D. establishments is the Royal Aircraft Establishment (RAE) at Farnborough. With its out-stations at Bedford and elsewhere it employs nearly 9,000 people and absorbs about one-half the manpower and one-third the total cost of all seven R. & D. establishments. In addition to its original function of research and development on aircraft, this establishment now plays the major part in research and development work on guided weapons and aerospace craft.

The proving and acceptance testing of military aircraft and aircraft armaments is undertaken at the Aeroplane and Armaments Experimental Establishment (A&AEE) at Boscombe Down, which employs some 2,000 people. This establishment assesses aircraft as complete systems, including their armaments, radio and navigational systems, to ensure they meet the needs of the Services in efficiency, safety and reliability.

Other establishments, employing considerable numbers in the development of techniques applicable to avionics are the Royal Radar Establishment (RRE) at Malvern, and the Signals Research and Development Establishment at Christchurch. The former establishment employs some 3,000 staff, and although its major effort is still applied to radar, in recent years it has played an increasing part in guided weapon work. The Signals R. & D. Establishment, with a staff of some 900, specialises in telecommunications, although it has particular reference to the needs of the Army.

Development bridges the gap between research and production, a process often involving a high order of engineering skill, and a process that does not necessarily end with the introduction of an aircraft into service. New requirements constantly emerge, demanding variations and modifications to equipment already in service. Production is the most costly part of the Ministry's activities, though by contrast it engages only a small part of its manpower. The control of production in line with development programmes involves detailed analyses and constant review of progress. While considerable responsibility is placed upon the main industrial contractor, the Ministry is inevitably deeply involved in both the technical and financial problems.

Along with these responsibilities, the Ministry has the additional task of ensuring that equipment is of acceptable quality. For this purpose the Director General of Inspection controls two separate but closely controlled inspectorates, one for aircraft, aero-engines, and guided missiles, and the other for electrical and electronic equipment and nuclear weapons. These inspectorates employ approximately 2,600 non-industrial staff and 1,500 industrial workers throughout the country.

The Effect of Government Policy.

Over the past years the aircraft industry has been the subject of bitter controversy centered on the need for its contraction and rationalisation. The general pattern has been one of government-induced amalgamations, wholesale scrapping of expensive defence projects, redundancies and short-time working within the industry. While the main effect was on the production of airframes and aero-engines this in turn reflected upon the avionics sector.

The first indication of possible effect from Government policy came in 1957 with the publication of the Defence White Paper, outlining a new defence policy, which placed greater reliance on guided weapons than upon the conventional manned aircraft. In the face of a probable reduction in military contracts, the industry turned increasingly to the civil market where it found conditions becoming more difficult as aircraft became more complex and costly, and competition more intense.

In 1959 a new ministerial department was created, the Ministry of Aviation, by the amalgamation of the Ministry of Supply and the aviation side of the Ministry of Transport and Civil Aviation. The new Ministry turned its attention to the companies engaged in aircraft manufacture and as the result of Government decisions a series of mergers was induced between the major aircraft companies.

The main points of these decisions were:

(1) that the Government would provide increased financial support for promising civil aircraft and aero-engines projects. The nature of this support would vary but could entail help in production re-tooling or in the initial costs for major new types of aircraft or engines.

(2) that the Government might finance the production of a limited number of aircraft beyond the firm orders received from elsewhere, to ensure early delivery dates. This suggested that the Government was prepared to finance building aircraft and engines for stock.

(3) that in order to avoid duplication and waste of resources the needs of the R.A.F. Transport Command and the state Airway Corporations would be harmonised.

(4) that the Government might be prepared to make a further contribution by helping to finance the costs of proving a new type of aircraft in airline service.

(5) that the Government would support a substantial level of direct aircraft research.

These were believed to be the general lines of Government policy early in 1960; since then however considerable criticism has been voiced concerning the policy and the way in which it worked in practice. The general idea of the mergers was that considerable rationalisation of the industry would follow, involving a big reduction in the labour force. The centralisation policy of the Government did however result in the formation of five major groups of companies.

In the airframe manufacturing sector this has resulted in the mergers of the aviation interests of Vickers Armstrong, English Electric and Bristol Aircraft to form the British Aircraft Corporation, and the merger of Folland, Blackburn, and de Havilland with Hawker Siddeley. Two main groups emerged in aero-engine manufacture, Rolls-Royce and Bristol Siddeley, while Westland became the sole helicopter company. Several companies remained uncommitted, Short Bros. and Harland, Handley Page, Alvis Auster and Scottish Aviation.

One purpose of rationalisation of companies in aircraft production was to contract the industry without causing politically embarrassing pockets of unemployment. At that time the industry was estimated to employ 240,000 workers (later figures show this as 285,000), but its future prospects for stabilised employment were estimated to cover only some 150,000. It was recognised that amalgamations of industry would not obviate the need to reduce its size, but it was hoped that larger groups with interest in other industries would make it easier to absorb redundant aircraft workers.

However, the expected unemployment did not come about in the first two years; in fact, at the end of 1961 there were approximately 295,000 employed within the industry - twice as many as in 1950. The new groups showed no disposition, because of their volume of work, to curtail their operations in the way and for the purpose it was assumed the Government required. "Now they are being warned by the Government to reduce total capacity by perhaps as much as 25 per cent and also to reduce the ratio of designers they employ." (The Economist, 30th December, 1961)

In April 1962 it began to appear that the Government's plans for contraction in the industry were beginning to operate. Redundancies and closures were announced, Napier and Rolls-Royce declared their intention of making 3,000 redundant. In the House of Commons on the 22nd March, 1962, the Opposition had tabled a motion criticising the Government policy in connection with the aircraft industry. The Minister of Aviation countered with an amendment which commended both the aircraft and associated electronics industries for their performance, adding that the policy had been to merge the industry into larger units, whereas the Opposition's alternative was nationalisation.

While there was a strong case for the nationalisation or even part government control in the industry at that time, there was also an urgent need for rationalisation whatever form it took, especially if it led to fewer independent designs, making possible greater concentration on the development of single projects. The aim of the Government at that time was to attempt to produce sufficient technical competition to maintain lively engineering teams in both airframe groups. However the problem developed into one of how best to achieve this, without resorting to nationalisation or some form of control, with as little wastage and duplication of resources, while at the same time maintaining the stability of employment vital to ensure recruitment of new talent into the industry.

As an industry faced with the problem of over-capacity, and operating in a market that could label the product obsolete both at the production and even the development stage, rationalisation of the industry was not only essential but inevitable if it was to continue its existence. It is now clear that the degree of rationalisation brought about by the mergers has not been sufficient to solve the problems of the industry.

In addition, it was considered that the mergers would, to some extent, smooth out the uneveness in the development and production of defence contracts. The time-scale operated by the aircraft industry engaged on the design and production of military aircraft was such that in a number of instances the aircraft was declared obsolete within a short time of reaching production. In some cases, despite the extended development period, serious defects occurred after entering service. Some notable examples being the Comet, Tudor, Hunter, Swift and Javelin aircraft.

Although it was hoped that this situation would be corrected, it was not foreseen at that time that one of the new group's major military projects, the TSR-2 low-level attack aircraft, which would cost an estimated £195 million to develop, would suffer the same fate as the £12 million Bristol Brabazon and the £8 million Princess flying-boat of the early 1950's.

In April 1965, the Minister of Aviation announced the cancellation of the TSR-2 and at the same time the Hawker Siddley P-1154 and the HS-681 projects were also cancelled, causing consternation in both the aircraft and the electronics industry. As a result, redundancy among aircraft workers was expected to be inevitable, although to date it has not reached the proportions at first feared. Despite these set-backs, the aircraft industry remains a vitally important part of the economy and a source of employment for approximately a quarter of a million people.

Not only is the government the largest investor in aircraft research and development, around £677 million in the period 1959 to 1962 (including space research), but it is by far the biggest, and fastest growing, customer of the aircraft industry. In 1964 it spent £333 million as against £277 million in 1960, and accounted for three-quarters of the industry's sales. In 1960, aircraft exports totalled £117 million but this figure has decreased yearly to £85 million in 1964. The prospects of the industry are considered in the Government's 1970 National Plan, which states: "The future prospects of the industry depend in large measure on the defence programme and on the recommendations of the Plowden Committee".

The Effect on Avionics

The effects of past and future policies upon the aircraft industry have shown concurrently upon the avionics sector of both industries, aircraft and electronics. The effect however will be more marked in the aircraft industry than in the electronics industry because of the latter's increasingly diversified interests and activities.

Of immediate concern to the electronics industry, not only in relation to the contraction of the aircraft industry and the cancellation of military projects, is the intended purchase by H.M. Government of military aircraft complete with electronic equipment from the United States. Severe reservations have been expressed upon the possible effect on the avionics sector of the industry as well as the long-term effect on other sectors, including components, valves and semi-conductors, of the proposed purchase of "packaged" aircraft.

In the case of the Hercules C-130-E and the Phantom F4 programmes, current information assesses the amount of electronic equipment, including spares over the lifetime of the aircraft, at at least £100 million. The electronics industry considers that not only would this strengthen the position of their United States competitors, but it would reflect in the direct loss of manufacture and employment in all sectors of the electronics industry as well as contributing to the break-up of highly skilled research, development and design teams engaged in avionics. If further purchases of American aircraft, such as the F-111, were undertaken by the British Government this would detract from the chances of British electronics appearing in them.

On the British military procurement front, both industries await the results of the Defence Review, but in the meantime orders for electronic equipment are forthcoming for the Hawker Siddeley military projects of the HS-801 maritime reconnaisance aircraft and the Kestrel P-1127 vertical/short take-off aircraft. Civil aircraft gives less cause for expectation.

Plowden Report and Avionics

In line with the aircraft industry, the prospects for aviation electronics will be largely influenced by the British Government's decisions to implement the recommendations contained in the Plowden Committee's Report on the British aircraft industry, published on 16th December, 1965. From the point of view of the electronics industry the most disturbing point about the report must surely be the omission, for all practical purposes, of electronics from the original terms of reference.

Whilst the Committee recognised the close relations and the common interests of both industries, there is no specific consideration of the possible effect on the avionic sector of electronics if the Committee's recommendations are implemented. British avionics has only been able to flourish in the past because the aircraft industry has produced a wide range of civil and military types, even though this has been detrimental in the long-term to the latter's competitiveness. However, the intimate connection that must exist during the development of airframe and electronic equipment makes it difficult to see how avionics development and design can continue to function effectively if the range of activity in the aircraft industry is reduced.

It appears certain that, in the post-Plowden era, Britain will be purchasing more aircraft overseas, particularly from the United States. The other possibility, that there will be more international co-operation in airframe development, is in such an early stage and there is so much political involvement that there seems little chance of this being extended until such projects as the Anglo-French Concord have been concluded and assessed. Whatever Britain's procurement policy may be, it appears that British avionics has less expectation of gaining sufficient rack-space in aircraft of foreign manufacture, since modern aircraft demand integration of avionics and airframe development.

The Problem of Statistics

Although there have been significant changes in manpower requirements and attendant demands for occupational adjustments as the result of the rapid expansion and susceptibility to technological change in both industries, certain difficulties arise when considering the effect in the avionic sectors of these industries. Not the least of these difficulties is the fact that this sector cannot be specifically isolated for detailed examination from either the aircraft or electronic industries.

It is apparent from the organisational structures of the major airframe and electronic companies that both operate divisions or subsidiary companies engaged in the field of aviation electronics. What is not so apparent is the proportion of the total manpower engaged in the research, design, development, production and installation of aircraft electronic equipment. This is due mainly to the extended, and continuing, range of interests and activities of both industries, especially in the application of electronics to other industries.

The major problem, however, is one of available statistics, and in the case of the electronics industry it is basically one of definition. The main source of manpower statistics in the United Kingdom is to be found in the monthly publications of the Ministry of Labour Gazette, the most recent survey of occupational change in both industries being contained in "Manpower Studies No.2" conducted by the Ministry's Manpower Research Unit.

The scope of the surveys, as of the monthly returns, is limited to the definitions laid down by the Minimum List Headings within the Standard Industrial Classification. In the case of the aircraft industry this is listed as MLH383 confining the survey to the following:

(a) the manufacture or assembly of airframes or complete aircraft, gliders, guided missiles or aero-engines.

(b) the manufacture of parts or accessories excluding electrical or electronic equipment.

Similarly, the electronic industry is classified under Minimum List Heading No. 364, which covers the diverse range of products of the industry under the description of Radio and other Electronic Apparatus confined to the following groups:

(a) Radio, radar and other electronic capital goods.

(b) Broadcast, receiving equipment and gramophones.

(c) Valves and semi-conductors.

(d) Radio and electronic components.

The Minimum List Headings of both industries not only confine the manpower surveys but partially exclude the avionics sector. In the case of the aircraft industry, while the avionics sector is included in the manufacture and assembly of aircraft, the manufacture of aircraft electronic equipment is excluded. The electronic industry on the other hand still encounters a problem of definition for its products, apart from the difficulty of isolating the sector of avionics in relation not only to manpower but also to production.

The Electronics Industry

It is difficult to define electronics or electronic capital equipment in terms of a single industry or a group of products. There are some products that are electronic by nature, for example, radio and radar, but a great deal of activity undertaken by the 'industry' is in the application of electronic techniques in systems serving all products and industries.

Formerly, there was appreciable resistance, even in sections of the industry itself, to the idea that electronics in its various aspects could be regarded in any integrated sense as one basic industry. The achievement of the 'electronics industry' to stand in its own right, is of fairly recent origin and probably dates back only as far as the formation of the National Economic Development Council for electronics in 1962, when electronics was defined as an industrial category. This was further strengthened in the following year by the formation of the Conference for the Electronics Industry to consider matters of policy affecting industry-government relations.

Despite this recognition of electronics as an industry, the difficulty of definition still exists and this, combined with the facts that the industry is an emergent and rapidly expanding one (or at least has the potential for expansion), and that its susceptibility to technological change is high, means that official statistics have usually been formed only recently. In addition, many of the firms engaged in the manufacture of electronic capital equipment have interests in, or are closely associated with, other companies engaged in other sectors of engineering.

For these reasons the available statistics on production, exports, imports, investment and employment are generally considered to be both unreliable and inconsistent and serve only as a general guide to trends rather than as absolute values. Although no separate figures are available for aviation electronics, some attempts have been made to assess the possibility of growth in the market for electronics in this special application.

In the United Kingdom the industry is taken to be that contained within the Minimum List Heading 364 in the Revised Standard Industrial Classification (1962). In addition, the National Plan advocated that any future statistical analysis of the electronics industry should include telephone and telegraph equipment (MLH 363). Despite some of the difficulties of United Kingdom statistics, it is considered that those collected by the Ministry of Aviation represent the longest term attempt to measure electronics output. However, certain omissions have occurred, due to security and competitive reasons, preventing a comprehensive survey of the past build-up of the industry to its present structure.

It has been estimated that the world electronics industry has been one of the fastest growing in the last fifty years, with a compound rate of growth of over 10 per cent at constant prices since 1935. This rate of growth has been attributable to the volume of production that took place in the consumer goods sector of the industry, mainly in radio and television. While there has been a levelling-off in production within this sector, the output of electronic capital goods has been increasing at over 15 per cent per annum at constant prices over the last six years.

In the United Kingdom, as in other countries, the electronics industry has a vital part to play in the national economy; its contribution lies in increasing exports, reducing imports and finally in raising the industrial efficiency of the country by the application of automation, control and communication techniques. So far as the electronics industry is concerned, it offers a rapidly expanding market in automation, probably to the detriment of the export market; however, the two are so closely interdependent that the one could act as a stimulus to the other.

If the growth predictions of the 1970 National Plan are to be achieved, electronics must attain its own forecast target, for the productivity of other industries is increasingly dependent upon the use of control, computor and communication systems. The key sectors for expansion under the present government policy are automation and data processing, with automation in the forefront because international competition would seem to be less. During the remainder of this decade, industrial control equipment and associated instrumentation should prove to be one of the fastest growing sectors.

Even the most optimistic observer of official statistics would have to admit that the performance of the United Kingdom electronicsindustry over the last two years has been comparatively low. While imports have been restrained to a degree, exports have remained particularly static, despite the National Plan's 'directive' that they should rise by 9.8 per cent per annum. During the period 1959 to 1963, total electronics exports increased at an average annual rate of 10 per cent.

According to the National Plan, total electronics exports in 1964 amounted to £576 million, the 1965 figure is estimated to be £627 million, and output is expected to rise by some £50 million annually to £884 million in 1970. In the capital goods sector, 1964 saw a total output of over £200 million which represented a considerable increase of 32 per cent over the previous year. While £62 million of this sum was for military procurement, which is expected to decline over the next few years, the first quarter of 1965 recorded a further gain of 10 per cent over 1964 in this capital goods sector.

Since the war, military applications of radar and navigational aids have been extended to early warning systems, guidance of missiles, etc., while civil applications have also grown rapidly in air traffic control, airborne and marine radar and navigation systems. Indication as to the extent and importance of aviation electronics is given by the fact that, since the war, the "radar and navigational aids" group has developed to form the largest single category of electronic capital goods in both the United Kingdom and the United States.

For example, in 1963 the output of the capital goods sector of the United Kingdom electronics industry was almost £200 million and of this £56.9 million went to aviation. Aviation electronics equipment had civil sales of £7.4 million, defence sales of £28.1 million, and exports of £21.4 million.

Overall output trends during the past years cannot be accurately deduced, as 1963 was the first year in which figures of home defence expenditure on aviation electronic equipment were made available. The following figures give some indication of the growth of this sector. In 1960 exports were £13.5 million, in 1961 they were £13.3 million, in 1962 the figure was £17.3 million, showing an increase of 30 per cent, and in 1963 the total was £21.4 million, an increase of 23.7 per cent over 1962.

Manpower Statistics

The main source of manpower statistics for the industry is to be found in the publications of the Ministry of Labour. However the industry's own estimates are usually about 10 per cent lower than those of the Ministry, which is mainly due to the differences in definition.

While manpower statistics, like production levels, are not considered absolute values, they do indicate the trend of employment and reflect the continuous growth of the industry. At the same time, they reflect that whatever the contraction in the aircraft industry it has had no appreciable effect upon employment in the electronics industry.

The following table indicates this trend in employment over the last decade.

Year	Thsds.	Year	Thsds.
1953	144.8	1960	232.0
1954	162.8	1961	235.4
1955	191.8	1962	259.4
1956	174.5	1963	264.3
1957	185.3	1964	290.8
1958	186.6	1965	299.2
1959	(196.2 (211.9		

N.B. The figures prior to 1959 are based on the 1948 Standard Industrial Classification. The figures from 1960 are based on the 1958 Standard Industrial Classification. The figures for 1959 are shown on both bases.

The following table gives the comparable levels of employment in both the electronics and aircraft industries.

	Electronics	Aircraft
1960	232.0	292.5
1961	235.4	302.1
1962	259.4	278.8
1963	264.3	262.7
1964	290.8	262.8
1965	299.2	250.5
1966	299.2	250.3

The gradual decline in the aircraft industry is shown against the annual increase in electronics. The two columns are almost reciprocal. In 1963 both industries were employing approximately the same number of people, each providing 3.1 per cent of total employment in all manufacturing industries and 1.2 per cent in all industries and services.

But, whereas employment in the aircraft industry, although reaching its peak in 1961, shows a decline of 8 per cent between 1958 and 1963, the electronics industry shows an average increase of 31 per cent in the same period.

However, official figures of employment and unemployment in the British aircraft industry show that a decline in employment does not mean a proportionate rise in unemployment. It is clear that most of the redundant workers are re-employed fairly quickly. In some cases, also, employment and unemployment actually rise at the same time, indicating that there is little relativity between the two, as yet.

Within the aircraft industry the most important influence on employment has been the size and range of demand, which over a large field implied Government support both in the extent of design and development and in quantity production. The increasing complexity and sophistication of aircraft and components has also been a significant factor. Other factors contributing to the continuing high levels of employment are (a) the range of interests of aircraft companies in other engineering products, (b) the retention of labour in the face of acute labour shortages in other sectors of industry, (c) assured profit levels on Government defence contracts carried out on a "cost-plus" basis and (d) the industry does not offer great scope for automation.

The trend towards more complex products and emphasis on research and development has led to significant increases in the employment of scientists, technologists and technicians, while the proportion of skilled operatives has not shown any pronounced change, although some alteration in the demand for particular skills is taking place, e.g. the demand for electricians for maintenance and electronic work.

So far, occupational changes have not been predominant in the industry although trends show that toolmakers and toolroom fitters, have declined by 4 per cent and will continue to do so with the introduction of numerically controlled machines and tools. Inspector grades have maintained their proportion in the face of electronic inspecting techniques.

The Electronics Industry

The major factor determining the size and type of the labour force in the electronics industry has been the expanding demand for its products. Production increases in range as well as volume have outweighed any substantial technological change. In addition, technological change in customer industries has had a direct effect on the expansion of labour in the electronics industry. In relation to the aircraft industry, any decrease in the number of aircraft produced is seen to be offset by the considerable increase in both volume and sophistication of aircraft electronic equipment demanded by modern aviation.

One of the salient features of the labour force is the relatively high proportion of women employed; the number has increased by between 30 and 34 per cent between 1958 and 1963. The proportion of the total labour force has remained around 44 per cent and is attributable to the extensive use of women on assembly work although they are also employed on a variety of semi-skilled work. The employment of women, especially married women, has acted as an employment cushion in meeting fluctuations of production.

Another feature is that nearly half the males employed are in the "white-collar" category, that is, administrative, technical and clerical grades. The number in this grade has risen over the period 1958 to 1963 by approximately 38 per cent, as compared with a 31 per cent increase in the total labour force. Other notable increases are scientists, engineers and technicians by 43 per cent, technicians by 49 per cent.

In the skilled group, as with the aircraft industry, there has been a tapering off of demand for certain trades, notably toolmakers, toolroom fitters, etc. while the increase for electricians, 49 per cent, constituted the most substantial, past and prospective, increases in the skilled sector.

Hitherto, no revolutionary changes in occupational structure have taken place, but there is every indication of a transition in the labour force composition. The next ten to fifteen years may bring about substantial manpower changes affecting both the balance between the different categories, e.g. relatively more technicians and semi-skilled females on production, and the balance within the particular category, e.g. relatively fewer skilled operatives on production and more on maintenance. It is also expected that changes in demand for specific skills will take place, including increases in employment for electricians maintaining electronic equipment.

The growing use of automatic assembly methods, coupled with the breakdown of work requiring manual skills, seems likely to result in a growing demand for semi-skilled workers particularly women and girls.

Manpower Problems

The chief manpower problems facing the electronics industry have been described in the industry annexe to the 1970 National Plan.

The acute shortage of manpower is one of the most difficult problems facing industry today. New demands in highly technical fields such as "electronics" are already overtaxing the resources of skilled and semi-skilled personnel. The manpower problem in such highly specialised fields is not simply a shortage of numbers, although this need is an urgent one, particularly in the electronics industry since it must expand in order to help solve these same problems in other industries by providing alternatives to labour.

However, the industry's dependence on an adequate supply of qualified specialists at all levels, from the semi-skilled worker to the graduate, is made more acute by the fact that these skills are needed not only inside the electronics industry but also in customer industries, wherever electronic devices are used.

Secondly, there is the fact that the introduction of electronic devices, like other forms of innovation, tends to change the pattern of employment and often to bring about redundancy. This depends upon the rate at which technical innovation is applied and whether the social consequences can be absorbed. Two examples of these technological changes which were expected to incur far-reaching employment changes are transistors and printed circuits which are already widely applied. The implications of microelectronics are, as yet, unclear.

The third problem facing the industry lies in the size of its manpower requirements. Employment has been growing fast in the industry, increasing by 5.5 per cent per annum between 1960 and 1965, and the projected estimates to 1970 are set at a growth rate of 3.4 per cent per annum, i.e. about an additional 80,000 people.

Obviously, this points to the urgency of increasing and improving recruitment and industrial training, particularly in technology and management. The pace of change is creating an insatiable demand for scientists, technologists, engineers and technicians. Fortunately increasing attention is being given by Government, industry and trade unions to the long-term aim of increasing the total numbers of skilled people in industry. The industrial training boards will also make a major contribution once their policies and actions take full effect.

A fourth problem relates to the regional distribution of the industry's labour force and its future growth. Over three-fifths of employment in the industry in Great Britain is at present concentrated in the South-East. Two-thirds of employment in Radio and other Electronic Apparatus (MLH.364) is in the South East, while Telephone and Telegraph Apparatus (MLH.363) has 39 per cent in the South-East and other concentrations in the Midlands and North-West.

In broad terms the concentrations of employment are:

London and South-East	67 per cent
North Western	9 per cent
Midlands	7 per cent

The regional problem is a complex one: for a number of years there has been a general drift of population to the South-East of England and the Midlands and away from other regions. In general this has reflected the pull of employment opportunities in the former regions while there was relatively high unemployment in others, and this in turn appears to reflect the greater dependence of the latter regions on declining industries and their smaller share of growth industries.

The problem of the industry in this respect has been the difficulty of electronic firms in obtaining highly qualified technical employees when they wanted to expand away from South-East England. One would expect highly qualified technical personnel to be more mobile and less tied to particular localities than other categories of labour. The result has been that while there has been a certain movement of electronic production units into the developing areas there has been a tendency for the research and development establishments to remain.

Efforts to get qualified technicians to go to particular parts of the country depend upon certain factors, the most important being, (a) the relative salaries, working conditions and career prospects, and (b) the living conditions in the area, including its cultural and social amenities.

As far as salaries are concerned, although manual workers' earnings in the less prosperous regions tend to be below the national average, it has been suggested that technical personnel will have to be paid more to go to the development areas. In some respects the development areas may be an advantage compared with the congested areas of the South-East and the Midlands, especially in the case of lower housing values, but congestion is mainly limited to the Birmingham and Greater London conurbations and is not a problem in all parts of the South-East and Midland regions.

As far as living conditions are concerned, in addition to the economic attractions, the drift to the South would appear to reflect a preference for living in that part of the country, which may be due in part to the social and cultural amenities available, in part to climate and in part to the general mode of living.

The importance of social investment is recognised in the Government's regional policies, but it is likely that much still needs to be done to improve the social infrastructure of the growth areas.

Another possible disadvantage of the development areas , mentioned in the report of the National Economic Development Committee, "Conditions Favourable to Faster Growth," is the difficulty for technical personnel to keep in touch with current technological developments. However, this is not necessarily an important factor where electronic departments have been established in Universities and Colleges of Advanced Technology but the question arises whether enough is being done in this field in all the regions.

ROLE AND ATTITUDE OF
TRADE UNIONS

ROLE AND ATTITUDE OF TRADE UNIONS(1)

by R. Cottave,
Deputy Secretary-General,
Fédération des Ingénieurs
et Cadres, C.G.T. - Force
Ouvrière (France).

Introduction.

The trade-union organisations of the four participating countries all deal with such tasks as research and information, the negotiation and conclusion of collective agreements, the administration of such agreements, and the management of training programmes and workers' funds. These activities will be discussed first of all; while the second part will speak of trade union attitudes, as emerging from comments in the reports, towards employers and the public authorities, and in the more general context of rapid economic and technological changes.

1. Tasks of trade unions

1.1 Research, including the furthering of knowledge in regard to economic and sociological processes and the relations between them as well as forecasting, is a major trade-union activity in all the countries. Mr. Vesey Holt notes that he obtained much of his material from sources(2). Research takes place at different levels, but the trade unions still appear to have considerable trouble in collecting needed data. Attention is drawn to the inadequacy of manpower statistics (Mr. Breakell, Mr. Boutaud), employment forecasting (Mr. Laroussinie), while in the electronics sector it is frequently impossible to isolate useful figures from general data applying to the electrical engineering industry (Mr. Breakell, Mr. Javaux).

Although such studies generally corroborate surveys by Government or management, these may sometimes be challenged along unusual lines. Mr. Scanlon thus mentions layoff plans by employers in the event of an order being cancelled. The announcement of highly exaggerated figures, he says, is a good example of the capital made out of workers' fears and hence their militancy to bring pressure on the Government in favour of interests other than their own. The experience of trade unions and systematic observations by the leadership contribute data illustrating workers reactions to situations of concern to this conference.

As Mr. Vos notes, "the Dutch worker is very much attached to continuity of employment, and often prefers such continuity to the possibility of higher wages." In this he appears not to stand alone. Examples from other countries show lasting security of employment to be the foremost component of worker attitudes.

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(1) These notes do not constitute a general report and must be regarded as only an aide-mémorie for the Conference proceedings.
(2) See the Final Report to this Seminar

Another recurring factor in various cases described (United Kingdom, France, Netherlands) is the high rate of worker resistance to geographical mobility. Housing, family or cultural considerations are often cited as explanations. Others may exist, as Mr. Laroussinie suggests, such as the fear that retraining may be impossible should difficulties arise in the area of relocation.

It would no doubt be interesting to have information on the younger age groups of the population, or those having received a more thorough general education. Reports in regard to engineering or skilled technical personnel show that the reluctance to move is quite as great.

The English example, to which we shall return later, throws some interesting light on individual behaviour in the case of mass dismissal. By being able to count on reliable protection schemes, (R.P.A.) and on learning the facts from the trade unions, workers voluntarily determine what their fate will be instead of depending on more or less adequate selection rules.

Where such rules - or rather the tradition behind them - are concerned, credit for Mr. Scanlon's courageous comments on what he calls the "LIFO" (last in first out) principle, i.e. the advantage granted to length of service when determining redundancies, must be laid to trade-union research. Application of this principle in a sector or region subject to frequent change can in fact handicap workers, by preventing them from ever building up enough seniority. Such a principle moreover serves to aggravate the state of affairs previously mentioned, which is the reluctance to move. It no doubt also explains the attitude of personnel officers, who are apt to be suspicious of a job applicant with a record showing numerous changes of employment. Just as any other - we again quote Mr. Scanlon - the principle cannot, on grounds of fair play, be applied to the exclusion of all other considerations.

Where forecasting is concerned the main field of trade-union research has been the utilisation of manpower. Mr. Breakell thus notes that in the electronics industry the next ten to fifteen years should bring about substantial changes in the labour-force composition, i.e. more technicians and semi-skilled females on production and more skilled workers on maintenance.

Training problems are primarily approached from the standpoint of aims and structures. It might be well to question participants on research into the training of adults, particularly the content needed in general education to promote rapid adjustment in some new speciality.

Research, owing to the facilities available for dissemination, is the trade unions' primary tool for keeping the workers informed.

Acting on his own, the individual as a rule is naturally unable to conceive of or even select a suitable course of action, whenever economically and psychologically difficult circumstances arise and he must change his occupation or place of work. The information which is assembled by the trade unions - and which labour is more apt to rely upon - allows the workers to map out their own future for themselves. This is perhaps a decisive factor in promoting a fair solution to the problems here dealt with.

1.2 The negotiation of agreements or new rules and regulations is the most traditional trade-union activity, and any detailed review of achievements in the various countries would, we think, serve no useful purpose.

In the sectors here studied, a point which should be mentioned is that the most telling action appears either to take place on a national scale in discussions with the Government, or at the level of the firm itself.

The most important results have been achieved in unemployment protection schemes and in training facilities. The reports thus contain interesting material on such new English legislation as the Redundancy Payments Act and Industrial Training Act, the French National Employment Fund ("Fonds National de l'Emploi"), and the Netherlands scheme of shorter working hours with wage compensation in the event of temporary employment difficulties (Mr. Scanlon, Mr. Boutaud and Mr. Vos).

The various reports also contain examples of negotiations and agreements at firm level, which might well be retained in extenso.

Stress should here be laid on a general trade-union tendency, which is not only to guarantee workers maximum protection in the event of "economic accident", but, better still, to cause measures to be taken which will prevent the occurrence of such accidents, since they can now be foreseen.

1.3 Administration. For want of a better term, this describes the direct part played by trade unions in administering collective bargaining agreements - the most usual aspect - or in the management of training and readjustment programmes. This aspect of trade-union action, apt to be little known, is gaining ground. The reports describe the structures and aims of the training programmes in which the trade unions are engaged, whether alone or in conjunction with both management and government.

Most characteristic, however, seems to be the determination of trade unions to take a direct hand in solving employment problems at the most difficult stage. Thus the Belgian trade unions (Mr. Decoster) asked to share control in fulfilling exceptional orders. A French trade union (Mr. Laroussinie) proposed that it should assume direct responsibility in a relocation project. In these instances approval by the employers or government authorities was not forthcoming, but in the Bristol case described by Mr. Scanlon the trade unions, in spite of management opposition, were alone in implementing a readjustment policy they had themselves defined and in organising machinery suited to the purpose. The principle of voluntary movements by labour was the policy basis used. This required a continuing flow of comprehensive information, by means of facilities organised by the trade unions, covering both job opportunities and assistance available under the law and the company contract. Strict control moreover had to be exercised over measures taken in the meantime by management, particularly where working schedules were concerned. Supported by adequate legislation, the operation was a success, upsetting a good many previously firmly entrenched notions.

2. Attitudes of trade unions

2.1 No special reference is made to technical progress, at all events in the trade unionists' reports. While no undue optimism or pessimism is shown, such progress seems to be an accepted fact. All of us realise that, whether in the aircraft and electronics industries or in any other leading economic sector, the period of technological change we live in is no isolated, accidental - or hopeful - occurrence, but a continuous process. Despite occasional pauses from one year to the next, it is bound to gain momentum with the passage of time. This is the view which the trade unions generally hold.

2.2 Towards management the trade unions' attitude is no doubt a less conventional one. Owing to the search for job security, naturally the unions try to induce management to stabilise the level of company activity. Proposals differ according to country. Mr. Decoster thus notes that the Belgian aircraft manufacturers should develop technical relationships with foreign companies. European co-operation should be furthered to achieve a balanced rate of activity in each national industry, whether in the civil or military sector. Mr. Vos stresses opportunities for diversification, whenever the same skills used in aircraft production are required to manufacture new products. The list might be continued, but it will suffice to note that pressure is now exerted by the trade unions on the company's economic and trade policy.

2.3 But it is toward government that the attitude of trade unions appears to be most telling in the reports submitted. Mr. Scanlon cautiously suggests that when the TSR2 was cancelled the behaviour of the British unions was undoubtedly influenced by the fact that the decision was taken by a government they trusted. This might be considered a discreet way of stating the more general problem of relationships between the political power and the trade-union movement. It is better, of course, that there should be confidence in the government, which is expected to provide such essentials as the basic tools for fighting unemployment, the foundations for education and vocational training, and the services and information required to maintain full employment.

Constant pressure is exerted by the trade unions so that the structures promoting adjustment and mobility will be set up. In O.E.C.D. terminology, such action may be summed up as pressure for an "active labour market policy".

In the aircraft industry even greater demands are made by trade unions upon the political authority, since in its occasional role of employer and invariable capacity of leading customer it is primarily responsible for the workload and consequent level of employment. Here the trade unions have a great many proposals to make. The most usual one, even though sometimes sceptically advanced, has to do with international co-operation, particularly a European effort capable in some sector of achieving an output comparable to American levels. Long-term order programmes co-ordinated as between countries, appropriate financing methods, and a policy compensating for working time when orders are placed abroad are jointly advanced.

Decentralisation policy, which is for governments to formulate, ranges far beyond such considerations as guidance, training or protection. Here the policy expected of governments is an all-embracing one. Housing, education, recreation, diversity of industrial development - all these factors are decisive for success. Mr. Boutaud points to the danger of regional specialisation, and Mr. Van Velthoven notes, for example, that with the housing shortage as it is, workers stay where they are. Mr. Laroussinie describes similar difficulties in his account of a decentralisation operation from Paris to Bordeaux. Experience hence confirms that the overall aspect of government policy is a major concern of trade-union organisations.

There might be occasion here to revert to the contingency of an international disarmament policy, as analysed by Mr. Freeman, in order to ascertain the assumptions of trade unions on this point. This suggestion at any rate denotes the magnitude of the issues involved in trade-union attitudes towards the governing authority.

3. In the summing up, our general impression was that the reports show a firm grasp of present conditions on the part of the trade unions. But, in conformity with the Western pattern of society, the trade unions are worried about future developments. It is true that forecasting, however unreliable it may be in the economic sciences, can even less be depended upon in the social field. And it is towards collecting the data needed for such forecasts that the trade unions appear to have directed their greatest efforts.

SUPPLEMENTARY PAPERS

REPORT OF THE INTERNATIONAL ASSOCIATION OF MACHINISTS AND AEROSPACE WORKERS - U.S.A.

by the I.A.M. Research Department
(November 1965)

Employment in a specific aerospace plant, unlike employment in industries where one can predict certain seasonal or cyclical fluctuations, can vary considerably depending upon the phasing out or cancellation of a government contract. Efforts to lessen the economic hardship of those who are affected by constant massive layoffs through the negotiations of "layoff benefit plans" have not proved too successful; in order to insure adequate protection under these types of plans, too high a premium is required.

During this year's negotiations, numerous individual savings plans were included in the contracts. Under these plans, the employer will match on a 50 per cent basis a contribution that the employee will make. The funds accumulated in the account of the individual can be withdrawn in the event of layoff, retirement, death or entry into military service. Certain specific rules govern the withdrawal of funds for other reasons.

Providing the individual avails himself of the opportunity to participate in the plan, he is assured, at a minimum, of his own contributions plus interest, in addition to the company's contributions, if laid off. Under the old extended benefit plans, there were many who were laid off - and these were individuals with the greater seniority - only to find that the fund was depleted.

The new savings plans are not the entire answer and it is questionable whether in fact the problem of job security can be actually solved through the process of collective bargaining. We, and other labor organizations, have petitioned the government to establish a more rational system of letting government contracts to insure stability of employment. Further, we have requested that government assistance be given to the individual who is laid off, whereby he may be relocated, retrained, and can establish himself without loss of income in gainful employment.

While little progress has been made in the orderly letting of government contracts, the federal government, in closing 95 government installations, instituted a program of relocating and retraining those Civil Service employees who were displaced. Similarly, the Department of Labor has undertaken a limited program to assist laid-off workers in Long Island, New York, to relocate in California where the Douglas Aircraft Company has a large hiring program under way. These programs, hopefully, signal a new interest by the government in the job security problems of the aerospace worker.

ANNEX A

Selected Contract Settlements in the Aerospace Industry

by

I.A.M. - U.S.A. (1965)

I. Name of Corporation: Republic Aviation (now a Division of Fairchild-Hiller)

Location and Size of Bargaining Unit: Farmingdale, New York
2,200

Severance Pay

Persons who are permanently laid off, with at least 15 years of seniority, can now receive $1,125 in severance pay, compared with the former maximum benefit of only $500.

Pensions

Republic retirees now receive $3.25 per month for all years of service compared with $2.75 per month under the previous contract. A Republic employee who now retires after thirty (30) years of service can receive a maximum pension of $97.50 as opposed to the $75.00 maximum under the old contract.

II. Name of Corporation: Aerojet-General Corporation (Controlled by General Tire & Rubber Co.)

Locations: Azusa and Sacramento, California

Size of Bargaining Unit: 6,000

Key Provisions and Areas of Major Improvement in 1965

Pension

Pension benefits for Aerojet workers were more than doubled. The new contract guarantees retirees a coverage of $4.84 per month per year of service, compared to $2.00 per month under the old contract. The minimum age requirements for vesting have been reduced from age 40 to age 35, and a new survivor's option has been added.

The new plan allows early retirement at age 55. Persons electing this early retirement receive an actuarially reduced pension reduction of 3 per cent per year for each year of early retirement, contrasted with the 10 per cent per year reduction under the old agreement.

Severance Pay

Starting 1st August, 1965, the company has been setting aside $5.20 per employee per month to fund a new layoff benefit plan. Members with four or more years of service who are laid off for more than 4 weeks are eligible for benefits under this plan. The maximum benefit is $500 per employee.

Training

The company agreed to sponsor a joint company-union training program to update the skill levels of Aerojet employees.

III. Name of Corporation: The Boeing Company

Locations: Seattle, Washington; Wichita, Kansas; Michoud, Louisiana; Cape Kennedy, Florida; Vandenberg Air Force Base, California

Key Provisions and Areas of Major Improvements in 1965

Savings Plan

A savings plan has been established wherein an employee can save from 1 per cent to 5 per cent of his salary, and the company will contribute an amount equal to 50 per cent of the employee's contribution.

Pensions

Minimum pension benefits will be increased from $2.25 per year of service to $4.25. In addition to this benefit, an employee will receive a stipulated amount of his earnings in excess of the Social Security maximum. The minimum pension benefit will be $50 or $4.25 times the total number of years of service.

Individuals presently receiving pensions will have their benefits increased at the rate of $1.45 per month per year of service.

IV. Name of Corporation: Douglas Aircraft Company

Location: Santa Monica, California; Torrance, California; and Huntington Beach, California and off-site bases

Size: representing a total of 14,500 employees

Key Provisions and Areas of Major Improvement in 1965

Pensions

Douglas employees retiring with 25 years of service will receive $118.75 a month compared to only $57 they would have received under the old plan. Douglas retirees now receive $4.75 per month for all years of service in contrast to the old $2.29 average per month benefit - a 70 per cent increase.

Employees may now exercise the option of early retirement between ages 55 and 65 with at least 10 years of service. If 62 years or over, he will receive full normal pension. Under special conditions, he may elect special early retirement after age 55 during which time he will receive a special supplement until which time he becomes eligible for his Social Security benefit.

The employee is fully vested after 10 years of company service regardless of age. The old plan required 15 years of service and age 40. There is a new automatic survivor benefit that is payable for life to the widow or dependent widower of an employee who died before retiring but after having met minimum age and service requirements (age 55 and 10 years of service).

Present retirees (or those who retired before 1st December, 1965) receive an increase in pension equal to $1.45 per month times all years of their pension service credit.

The age 45 requirement for retirees on disability was eliminated. Totally disabled employees with 10 years of service also receive a special supplement income until they are eligible for Social Security.

Individual Savings Plan

Since 1960, Douglas employees, on a voluntary basis, have been contributing $5.00 a month into an individual savings account. This has been partially matched by a monthly company contribution. During this five-year period, many employees have built up individual accounts amounting to $1,000 or more. In the 1962 settlement, the company agreed to set aside 3¢ per hour per employee to establish a Supplementary Unemployment Benefit Plan. During the 1962-1965 period, approximately $1½ million was built up into this fund. In view of the favorable experience Douglas employees have had concerning their individual savings accounts, it was decided to take the monies accumulated for SUB and redistribute it on an individual account basis. The shift to individual rather than pooled insurance funds can be traced to the fact that over the past few years, largely as a result of massive unexpected lay-offs due to government contract cancellations, many aerospace workers with long years of service who have been laid off have not received any severance pay benefits as a result of inadequately funded Extended or Supplemental Layoff Benefit Plans. It is significant to note that other major aerospace firms, during the 1965 negotiations, including Lockheed, Boeing, and General Dynamics, have followed the Douglas pattern of establishing individual savings plans as an alternative to the ill-funded Extended Layoff Benefit Plans.

Apprenticeship and On-the-Job Training

The 1965 contract was the first in which the Douglas Company agreed to establish a bona fide four-year apprenticeship training program, as well as expand its on-the-job training programs to upgrade the skill level of other employees. The first recently negotiated apprenticeship program at Douglas will be for electronic technicians. Hopefully, these will be followed by programs for general machinists and jig and fixture builders.

V. Name of Corporation: General Dynamics Corporation

Locations: San Diego, California; Pomona, California; Vandenberg Air Force Base; Cape Kennedy

Size: Representing a total of 8,200 employees

Pensions

General Dynamics employees more than doubled their retirement benefits. The new minimum pension is $4.25 for each year of service compared with $2.00 under the old agreement. There is a variable scale based on earnings, whereby the maximum benefit can go as high as $5.75 per year for each year of service. The plan is fully vested after 10 years of service. Persons retiring on disability who have met the 10 years of service requirement can retire at any age.

Savings Plan

As a result of large employment losses, due to governmental contract cancellations, the inadequately funded Extended Layoff Benefit fund was converted into individual savings accounts. A savings plan was substituted for this Extended Layoff Benefit program and allows the union member to save a fixed percentage of his earnings which is partially complemented by an employers contribution (up to 50 per cent of the worker's contribution). In 1970 (the fifth year of the agreement), an employee will be able to save up to 10 per cent of his earnings. These savings, plus interest, will be available to employees at any time. Employees will be eligible for the full amount in the event of layoff, death, disability, retirement, or military service. Funds, including the company's contribution, may be withdrawn after three years.

VI. Name of Corporation: Lockheed Aircraft Corporation

Locations: Burbank, California; Sunnyvale, California; Marietta, Georgia; and Off-site Bases

Size of Bargaining Unit: Approximately 40,000 at all locations

Key Provisions and Areas of Major Improvement in 1965

Pensions

Lockheed employees now receive a minimum of $4.25 per month for all years of service compared with the old $2.00 minimum benefit. This benefit level will in all probability be much higher (closer to $5.00 or $5.50 per month) for most Lockheed employees, since the new plan establishes a sliding scale which is keyed to an employee's earnings.

An employee may now elect the option of early retirement. During this period, until age 65, he receives a supplementary payment amounting to $5 a month for each year of service up to a maximum of $125 per month.

The age requirement that an employee be 45 years of age in order to qualify for disability retirement was discontinued.

The company also extended a major medical benefit insurance plan for early retirees. This plan provides an annual deductible of $50, with the employee paying part of the cost for dependents coverage.

Employment Security Program

The inadequately funded Supplementary Layoff Unemployment Benefit Plan at Lockheed was replaced by a Basic Benefit Plan and Employee Savings Plan. In the Basic Benefit Plan, there will be established a personal trust fund for each employee to which the company contributes $20 a quarter ($80 a year). The fund is invested in bonds or stocks, depending on the employee's choice. If the employee is laid off, he collects the entire fund, including all interest and dividends that have accumulated. He also receives the entire fund upon retirement, entry into the Armed Forces, disability exceeding six months or death.

In the Employee Individual Savings Plan (which is voluntary) an employee may put up to $6.00 a week into a secured savings account. The company contributes 50 per cent of the employee's contribution and invests the total. Employees may draw upon this fund in the event of layoff, retirement, entering the Armed Forces, total or permanent disability or death. Even if he leaves voluntarily after four years, he may draw his own contributions (plus interest) as well as a portion of the company's contribution depending upon how long he has participated in the plan.

VII. Name of Corporation: Piper Aircraft Corporation

Location: Lock Haven, Pennsylvania

Key Provisions and Areas of Major Improvement in 1965.

Pensions

Effective 1st January, 1967, pension benefits will be increased from $2.25 per month per year of service to $3.50. An employee with 30 years service can retire at a pension of $105 per month. Employees retiring in the interim will receive the increased benefits on 1st January, 1967.

ANNEX B

Preliminary Outline of proposal by I.A.M. - U.A.W. for protection of displaced workers of defense contractors comparable to protection provided displaced DOD employees

PRELIMINARY OUTLINE OF I.A.M. - U.A.W. PROPOSAL FOR PROTECTION OF DISPLACED WORKERS OF DEFENSE CONTRACTORS COMPARABLE TO PROTECTION PROVIDED DISPLACED DOD EMPLOYEES

1. Workers displaced from the establishments of defense contractors as a result of a procurement action would be given preferential hiring rights for jobs for which they can qualify or for which they can be retrained, both in the plants of other defense contractors and in DOD and other federal facilities. (This could be implemented by setting up a single pool of workers displaced both from government facilities and from the establishments of contractors, with displaced government workers having first preference for other government jobs and displaced contractors' workers having first preference for jobs in establishments of other contractors. Displaced contractors' workers would then have preference for vacant government jobs not filled by displaced government workers, and vice versa).

2. All procurement contracts would include a provision requiring the contractor to give effect to the preferential hiring policy above; to list all job vacancies (except those to be filled by promotion from within or by recall of laid-off workers - whether laid-off from the same plant of the company or from another company plant) with the DOD's Central Referral Activity; and to comply with DOD requests to refrain from filling vacancies until workers in the pool of displaced workers had opportunity to exercise their preference.

3. Where retraining is required to enable the worker displaced from a contractor's plant to qualify for a job comparable in pay and status to his former job, retraining will be provided at government expense with 100 per cent maintenance of the worker's wage or salary during the training period.

4. If the worker is placed through preferential hiring in a job paying less than his former job, the DOD will supplement his earnings up to the level of his former wage for two years. (According to the New York Times of 21st April, 1965; workers transferred from the Brooklyn Navy Yard to the Philadelphia Naval Shipyard will have a "guarantee that present salary rates would remain in force for a minimum of two years").

5. When the worker is required to relocate in order to obtain new employment, the DOD would pay transportation and moving expenses for the worker and his family, and buy the house he leaves at a price no lower than the estimated market value as of the time immediately prior to the procurement action which caused the worker's displacement.

6. In order to minimize the necessity for relocation of displaced workers, the DOD would:

(a) make available to communities adversely affected by procurement actions the services of a professional group qualified to assist the community to adjust to the changes and to develop new economic enterprises;

(b) channel contracts into such communities to the extent permissible under present law and practicable in the light of the nation's defense requirements; and

(c) seek from Congress elimination of statutory restrictions on channeling defense and other government contracts into such communities, even if a price differential is involved, provided that the price differential is reasonable (considered in the light of the social costs that would otherwise result) and that the community is capable of meeting quality standards, delivery dates, etc.

7. The DOD would actively encourage defense contractors to establish security programs for their workers comparable to the best practice prevailing in significant non-defense industries. This would include provision for supplemental unemployment benefits, separation pay, insurance coverage for laid-off workers, etc. (Minimum standards for such benefits might be provided for in the procurement contracts, with companies and unions free to improve upon those programs through collective bargaining). The DOD would meet costs of financing such programs to the extent that the costs arose out of procurement actions.

8. DOD would agree to pay defense contractors a specified percentage of the value of each contract to be used for research and development work on non-military products to which the firm could convert, provided the research and development program were approved by DOD and an expert advisory panel as one that offered genuine possibilities of providing employment for the firm's workers and support to the local economy in the event the defense contract were to be terminated or cut back.

ANNEX C

The Aerospace Worker's Search for Parity

by

The International Association of Machinists
and Aerospace Workers

THE AEROSPACE WORKER'S SEARCH FOR PARITY

The Need for Job Stability in the Aerospace Industry

1. The aerospace industry has been characterized by the glaring lack of job security. Despite high levels of employment in this industry (today totaling 1.1 million persons), during the last eight years nearly a quarter of a million factory production jobs in the key aircraft and parts industries have been lost. This can be attributed to changes in defense requirements as well as the unsteady hand of government defense procurement policies. As a rule, employment cutbacks are much more sudden and sharp in their impact on the lives of aerospace workers and their families than those suffered by workers, in other industries. In aerospace, jobs are typically lost when an entire plant is closed down for an indefinite period of time, largely as a result of a contract cancellation. In most other industries, this is not the usual means by which job losses occur. Consequently, the aerospace worker finds himself not only unemployed, but unemployed in a community where thousands or tens of thousands of his fellow workers lose their jobs at the same time. In such a situation, the likelihood of finding alternative work in that community is quite remote. This has happened in recent years at Republic Aviation Corporation in Farmingdale, New York; the Ryan Aeronautical Plant in San Diego; and the Convair Division of General Dynamics in San Diego (at the same time this company is conducting a massive recruitment campaign at its Fort Worth plant as it begins production runs on the F-111 aircraft).

2. Another factor often overlooked, is the changing composition of the workforce in aerospace. The shift towards missiles and electronics has meant a sharp increase in the number of engineers, scientists, technicians, white-collar administrative workers and a sharp reduction in the number of blue-collar production workers. In fact, approximately half of the industry's workforce is now non-production workers. Relatively few laid off production workers from the aircraft sector could readily shift over to the missile and space field without some retraining. However, the training necessary to allow workers to shift easily from aircraft to missile work has rarely, if ever, been provided by the industry.

3. Government contracts are the lifeline to survival of this industry. Contract cancellations, which result in layoffs, have never been accompanied by any major government effort to assist displaced aerospace workers. Such adjustments are largely borne by the unemployed worker and his family. This is in sharp contrast to the Defense Department's assistance to government workers who were laid off as a result of recent defense installation closings.

The I.A.M.-U.A.W. Program of Job Security in Aerospace

4. We in the I.A.M. and the U.A.W. cannot create jobs in the aerospace industry. Obviously, our respective organizations cannot determine government contract awards or cancellations. These are set by changes in defense requirements, changes in technology, budget considerations and the like. However, we have an obligation to our membership in the aerospace industry to try to negotiate contract provisions that call for:

(i) Advance notice and consultation with the union whenever employers plan major changes.

(ii) Right to transfer not only to other jobs within the plant, but to jobs in other plants as well, with adequate moving allowances.

(iii) Training for new jobs (or old jobs which have not been eliminated) at full pay.

(iv) No reduction in the hourly rate of pay for workers who have been down-graded because of new technology.

(v) Supplementary payments to employees who are laid off because of technological change.

(vi) Early retirement plans with assurance of an adequate pension.

(vii) Continuation of insurance coverage and other fringe benefits during layoff and after retirement.

(viii) Wherever technology has increased skill requirements or job responsibilities, new job classifications and appropriate rates of pay should be negotiated.

(ix) The gains resulting from advancing technology and increasing productivity should be shared with the employees.

Pension Plans

5. The U.A.W. settlement in October, 1964, provides for company financed pensions which, including Social Security, means approximately $300 per month for the retired worker and his spouse. Current aerospace plans represent benefit levels that are only two-thirds of this amount. The current settlement reached with the United Steelworkers and the container industry provides for a benefit level equivalent to $5.50 per month for each year of service, which is even higher than the $4.25 minimum achieved by auto. Most aerospace firms provide for anywhere from $2.50 to $2.75 per month for each year of service.

Severance Pay Plans

6. After many years of prodding, the aerospace industry adopted an extended layoff benefit program. This provides a fraction of what long service workers get under severance agreements in auto and steel industries. In addition, the company's maximum liability (usually between $100 and $150 per employee) has proven to be insufficient in the case of massive layoffs. Such funds can be and in many instances have been, wiped out completely when large scale layoffs have occurred. Thousands of experienced aerospace workers have been laid off without having received even a penny from these plans.

7. While the recently negotiated container industry contracts provide for employment security programs in which the company contributes over 10¢ per hour per employee, the liability of aerospace firms is generally limited to a mere 3¢ per hour per employee. To fail to strengthen such programs in view of the instability of employment in this industry would be unthinkable.

Apprenticeship and Training

8. Historically, the aerospace industry has relied on others to do its training of skilled journeymen craftsmen. Whenever the I.A.M. and the U.A.W. have attempted to negotiate a bona fide apprenticeship training program in this industry, we have met a great deal of resistance and consequently, we have had little success.

9. Similar resistance has also been encountered when aerospace unions have attempted to develop training programs designed to raise journeyman skills as well as set up upgrading

programs for workers below the journeyman level. The industry's answer to our requests in this matter is their apparent preference for narrow specialists or what we call "fragmented journeymen". In our attempts to promote broad, comprehensive apprenticeships and other training programs, we have received no encouragement from the federal government - despite the fact that these are allowable costs under existing federal procurement policies.

OCCUPATIONAL TRENDS AND OUTLOOK IN ELECTRONICS MANUFACTURING(*)

NON PRODUCTION AND PRODUCTION WORKERS

Two outstanding features of the occupational structure in electronics manufacturing are (1) a trend toward increases in the relative size of the nonproduction work force, and (2) the existence of marked differences in occupational distributions among the industry's major product categories.

Non production workers -- engineers and other technical workers, administrative and executive personnel, and clerical and stenographic employees -- are expected to account for nearly half (48 per cent) of total electronics manufacturing employment by 1970 (table 15). They represented an estimated 40 per cent of such employment in 1961, 38 per cent in 1958, and only 19 per cent in 1950.[43] [44] Growth during the 1960's in the relative size of the nonproduction work force is projected for each of the electronic product categories, and is expected to be especially rapid in the categories of military-space and industrial-commercial products and of electron tubes.[45]

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[43] The 1950 percentage is based on different data from those in table 15 and is not precisely comparable, but it helps to provide a rough order of magnitude for the change since 1950. The 1950 estimate is based on information in "Expansion in Electronics Employment," Monthly Labor Review, February 1952, p. 151, and "The Effect of the Defense Program on Employment Outlook in Electronics Manufacturing," Occupational Outlook Handbook, Supplement No. 15, May 1951.

[44] For U.S. manufacturing as a whole, in comparison, nonproduction workers represented a smaller and less rapidly expanding part of the work force: 26 per cent in 1961, 25 per cent in 1958, and 18 per cent in 1950. (Data for 1961 from Employment and Earnings, June 1962; data for 1958 and 1950 from Employment and Earnings Statistics for the United States, 1909-60 (BLS Bulletin 1312, 1961).

[45] The estimates in table 15 were developed from statistics of non production and production workers published monthly by the Bureau of Labor Statistics in its Employment and Earnings series. Since these figures are published by SIC group, they had to be converted to the product categories of table 15. Because of the form in which the BLS data are available, estimates for the military-space and industrial-commercial product categories could be developed only as a combined group.

The projections for 1970 involved the assumption that changes in ratios of nonproduction to production workers would continue, but not so rapidly as between 1958 and 1961. This assumption was based on analysis of the many variables expected to affect the industry and its employment composition during the remaining years of the 1960's. The projections were calculated by using approximately half the per annum rates of change in nonproduction-production worker proportions between 1958 and 1961, with slight variations from product category to product category as deemed reasonable in the light of special influences expected to affect employment in that category. The resultant proportions for 1970 were applied to the employment forecasts already made for that year to derive projected numbers of non production and production workers. Alternative projections of non production-production worker ratios were also made.

(*) From "Employment Outlook and Changing Occupational Structure in Electronics Manufacturing", Bulletin No. 1363, United States, Department of Labor.

The ratio of nonproduction to production workers varies widely between military-space and industrial-commercial electronics on the one hand (52 to 48 in 1961) and the consumer products and components fields on the other (each with a ratio of 27 to 73 in 1961 -- table 15). Manufacturing processes in military and space electronics, and to a lesser extent in industrial and commercial electronics, involve a great deal of R & D work and low-volume production of custom-made end products. In the consumer products and components fields, conversely, manufacturing processes tend to be of an assembly line, mass production nature.

The trend toward growth in the relative size of the nonproduction work force is due to several factors. One is the growing importance of R & D work and low-volume production of items made to order on a contract basis, thus increasing the need for engineers and other technical personnel and decreasing the need for semiskilled and unskilled production workers. This factor is especially significant in military and space electronics, and to a smaller degree in the industrial and commercial field, but the R & D content is high and increasing also in other products, such as semiconductors and special-purpose tubes. Another factor is the continual introduction of technological changes, such as mechanization in assembly line work, which tends to decrease the number of production workers needed to produce a given output. This trend toward automatic operation is especially significant where mass production techniques are the rule, as in the consumer products and components fields. Finally, the growth of record-keeping and communication requirements in modern business has caused an increase in numbers of clerical and other office workers, despite the introduction and expanded use of improved office equipment, especially for data processing.

The number of engineers and scientists in electronics manufacturing was estimated at 128,000 in 1960,[46] nearly 10 times as many as the estimated 13,000 in mid-1951.[47] The increase in these workers was considerably greater than the threefold growth in total electronics manufacturing employment over approximately the same period.[48] By 1960, engineers and scientists were estimated to represent roughly 17 per cent of total electronics employment.[49]

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[46] Electronic Industries Association, Electronic Industries 1962 Yearbook, p. 67. This estimate is based on a 1960 yearend survey by the EIA Marketing Services Department in co-operation with the Department of Defense.

[47] Mid-1951 estimate from "Expansion in Electronics Employment," Monthly Labor Review, February 1952, p. 154. As with the total employment figures in this report, both the 1960 and 1951 figures exclude engineers and scientists working for the Federal Government, universities, and nonprofit research centers (estimated at 22,000 by the EIA's 1960 survey).

[48] From an estimated 244,000 workers in 1950 ("Expansion in Electronics Employment," Monthly Labor Review, February 1952, p. 151) to 734,000 in 1960

[49] Calculated by relating the EIA survey figure of 128,000 engineers and scientists to the total employment estimate of 734,000 workers. This estimate has the weakness of being derived from two different sources, which may not be comparable in every respect. Scattered data in the files of the Bureau of Labor Statistics indicate that the percentage may be too high, and that 14 - 15 per cent may be a more accurate estimate.

Many production operations in electronics manufacturing have been mechanized in whole or in part in recent years, and many other operations are expected to be mechanized in the years ahead. The following discussion describes some of these innovations, separately for end-equipment and components manufacturing.

Mechanization in End-Equipment Manufacturing. No single development so modified the production of electronic end equipment during the 1950's as the introduction of the printed-circuit board, which eliminated the mass of wiring found in electronic products manufactured conventionally. The printed-circuit board consists of a laminate of paper and phenolic plastic, bonded to copper foil. A wiring pattern or circuit is printed on the copper foil. Components for the circuit are threaded through holes in the board so as to make contact with the copper. Soldering of these contacts can be done in one operation. "Because the board is regular in shape and puts all the conductors into one plane... /manufacturers in the 1950's were/ provided for the first time with the means of handling... production in automatic machinery."[50]

The printed-circuit board was introduced in plants manufacturing large quantities of standardized items, such as radios and television receivers. By the mid-1950's, most manufacturers of consumer equipment were using circuit boards in their products. By the late 1950's, circuit boards were standard equipment in computers and many other industrial and military end products. Since the introduction of these boards, numerous production improvements have been introduced in such processes as the insertion of components into the boards and the testing of completed circuits and equipment.

Many other innovations which increased productivity were introduced in end-equipment manufacturing during the 1950's and the early 1960's. Improvements were made in dip-soldering and plating techniques. New soldering, welding, and fastening devices were developed to speed assembly, even where miniaturized circuitry was used. Miniaturization of components and circuits reduced storage requirements and increased materials-handling efficiency. New types of movable conveyor systems were introduced. New machines were developed to transfer partly assembled units from one assembly line to another. Various devices were made to feed components more conveniently to assemblers. Improved types of automatic test equipment were engineered. Machine tools used in 1958 were, on the average, 40 per cent more productive than those of 10 years before.[51]

Greater efficiency was achieved by improvements in plant layout and facilities. Producers built or remodeled plants so that production lines could be realigned swiftly. Lighting systems were improved. Gas, electricity, water, and other utilities were placed for greater accessibility to production stations. The use of compressed air was introduced "to operate and feed small parts to bench and hand tools, to drive assembly machinery, for drying, painting, cleaning, and chemical tank agitation."[52]

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[50] "Automation," address by Dr. Elmer W. Engstrom, Radio Corporation of America, at the Centennial Symposium on Modern Engineering, University of Pennsylvania, Philadelphia, Nov. 11, 1955.

[51] George Sideris, "Production Machinery for the Electronics Industry," Electronics, New York, McGraw-Hill, Oct. 24, 1958, p. 73.

[52] Ibid., p. 77.

Mechanization in Components Manufacturing. The introduction of the transistor in the early 1950's represented an important development in the components field. Techniques to make transistors differ considerably from those used to make other components. Transistor manufacture is a chemical-metallurgical process; the silicon and germanium crystals used are specially "grown" and assembled in meticulously clean and fully air conditioned rooms. Although the first transistors were assembled entirely by hand with a relatively high rejection rate, improvements in techniques rapidly decreased unit labor requirements and increased product reliability and performance. Production lines were increasingly mechanized, with automatic equipment for such operations as assembling, sorting, and testing.

Advances in production techniques have occurred since the early 1950's also in the manufacture of components other than transistors. Tube manufacturing has become highly mechanized in all operations except mount assembly, and improvements in productivity continue. Test equipment is becoming more and more automatic, as exemplified by a machine which can test 1,800 electron tubes an hour. A computer-controlled assembly line has been introduced in an already highly automated plant making resistors, which has doubled the plant's production rate to 2,400 units an hour. Still another development is a multi-station winding machine which winds inductors automatically. Automated procedures are being introduced also in the relatively new field of microelectronics.

OCCUPATIONAL DISTRIBUTIONS AND TRENDS

To supplement and verify the material on occupational trends presented above, field visits were made in mid-1962 to several electronics establishments. Although the plants visited employed nearly 5 per cent of all electronics manufacturing workers and covered every major electronic product category, they do not provide a representative sample of the industry and the information received from them is illustrative only.

This information supports the conclusion that occupational patterns vary according to the type of electronic products made. Illustrative occupational distributions shown in table 16 indicate that, in mid-1962, non-production workers were in the majority (60 per cent of the work force) in military and space electronics manufacturing[53] but definitely in the minority (30 per cent of the work force) in consumer products manufacturing.[54] The greater emphasis in military and space electronics on R & D work and low-volume custom production is evident from these distributions. In military and space electronics, 33 per cent of the work force were engineers, technicians, and draftsmen compared with 11 per cent in the consumer products field,[55] 13 per cent were skilled workers compared with 7 per cent in the consumer products field, and 27 per cent were semiskilled and unskilled workers compared with 63 per cent in consumer products electronics.

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[53] The most comparable proportion shown in table 15 to this figure is that of 52 per cent for the 1961 nonproduction-worker proportion in military-space and industrial-commercial products combined. This would imply that nonproduction workers represent a smaller part of the work force in industrial-commercial than in military-space electronics.

[54] The comparable proportion shown in table 15, for consumer products manufacturing in 1961, is 27 per cent.

Assemblers were the largest manual occupational group, representing 42 per cent of all workers in the consumer products category and 16 per cent in military and space electronics (table 16). All assemblers in the consumer products plants were classified as semiskilled or unskilled but some in the military-space products plants were classified as skilled. Other relatively large manual occupational groups were inspectors and testers; analyzers and trouble-shooters; fabricating workers; processing workers; and machinists and repairmen.

A few of the plant officials interviewed in mid-1962 made comments and predictions regarding occupational trends. Discussing the future electronics work force, one executive of a plant making military-space and industrial-commercial electronic equipment stressed the role of microelectronics: "The composition of the work force of the future will depend heavily on the future of microelectronics. Although being developed mainly for its military and space applications, microelectronics will undoubtedly find application also in other electronic sectors. This growing field is creating an acute demand for technical people with background in solid-state work. It may affect production workers as well, since it should require fewer soldering, wiring, and similar operations and more microscopic, 'white room' work. This trend toward more and more miniaturization may increase the numerical importance of women in assembly work."

An executive in another establishment manufacturing military-space and industrial-commercial electronic equipment emphasized the especially rapid growth in numbers of engineers and other nonproduction workers: "Between 1958 and 1962, the number of engineers in this plant rose 68 per cent, the number of technicians 56 per cent, draftsmen 78 per cent, and clerical workers 58 per cent. During this period the total number of salaried workers increased 45 per cent while the number of hourly wage workers fell 10 per cent. As a result, salaried workers rose from 41 per cent of total employment in 1958 to 53 per cent in 1962. This trend is due mainly to the growth in contracts for missile and space electronics; these generally have a high R & D content and involve low volumes with extremely high reliability requirements. Engineers and related workers will find increasing job opportunities at this plant in the years immediately ahead. One possible exception is industrial engineers; the smaller production runs common to missile and space work may adversely affect job opportunities for them."

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[55] Engineers and scientists alone represented 21 per cent of the work force in military and space electronics and 6 per cent in the consumer products category (table 16). Additional data in the files of the Bureau of Labor Statistics, covering about one-seventh of total estimated electronics employment, show that in January 1961 engineers and scientists represented approximately 18 per cent of electronics employment in the military-space and industrial-commercial categories combined, 10 per cent in components manufacturing, and 7 per cent in the consumer products field. (Cf. estimates earlier in the present chapter showing that for electronics manufacturing as a whole engineers and scientists represent an estimated 14 to 17 per cent of all employment.)

An official in consumer products manufacturing evaluated the impact of technological change on production workers in his plant: "The drive toward lowering costs continues as a strong trend in this plant, in order to meet domestic and foreign competition. Innovations which make production processes more automatic occur frequently. Production workers displaced by technological change are not laid off but transferred to other jobs. In the short run, of course, innovations curtail the total number of production jobs, but the ultimate purpose is to increase reliability and lower costs and thus sell a greater number of improved, less expensive sets. To the extent this purpose is realized, technological change need not decrease employment on the production line. Production workers are usually the first to be taken on when sales demand increases."

The employment outlook differs considerably among occupational groups in a plant manufacturing semiconductors, according to an official of that plant: "The most promising future job opportunities here and elsewhere in semiconductor electronics exist for highly skilled equipment mechanics, electromechanical technicians, and electronics technicians.

"Engineering shortages may force continued reliance on some nondegree engineers, although the recruiting drive at this plant is for degree engineers. Nearly one-fourth of the engineers now employed here are nondegree engineers, almost all of them being former production or laboratory technicians who have been upgraded.

"Clerical workers may be adversely affected if the plant introduces computers for some of its office work, as is being actively considered. On the other hand, new jobs should be created for keypunch operators and other computer-associated workers.

"Job opportunities for semiskilled and unskilled production workers have been curtailed in this plant in the past two or three years by the introduction of automatic processing and testing equipment. This trend toward more automation may be expected to continue because it is part of our answer to improved product quality and reliability and to the lowered costs needed to meet competition both at home and from abroad. Future job opportunities for semiskilled and unskilled production workers will grow only if product demand expands sufficiently to more than offset anticipated increases in output per worker."

WOMEN WORKERS

Because of the numerical importance of women workers in electronics manufacturing, information concerning them was collected during the field visits made in mid-1962 and much of it is included in table 17. Although the data are fragmentary, they point up the relatively large proportions of women among production workers and the relatively small proportions in non-production occupations except clerical and stenographic. Women outnumber men in some types of production jobs, especially in mass production operations such as those in consumer-product and semiconductor manufacturing.

In 1961, women workers represented an estimated 41 per cent of total employment in electronics manufacturing (table 18).[56] For U.S. manufacturing as a whole, in comparison, women workers represented about 26 per cent of all workers in that year.[57] They represented a lower proportion (30 per cent) in the military-space and industrial-commercial category in 1961 and higher proportions in the consumer products (49 per cent) and components (56 per cent) categories. These differences are associated chiefly with differences in proportions of production workers. Women are employed mainly as production workers and therefore are more numerous where production workers are more numerous.

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[56] The estimates for 1958-1961 in table 18 were developed from statistics on women workers published quarterly by the Bureau of Labor Statistics in its Employment and Earnings series. Since these figures are published by SIC group, they had to be converted to the product categories of table 18. The methodology for doing this, and for developing the projections to 1970, is similar to that used to derive the data in table 15. Because of the form in which the BLS data are available, estimates for the military-space and industrial-commercial product categories could be developed only as a combined group.

Because the proportion of production workers to total employment in electronics manufacturing is expected to decline between 1961 and 1970 (table 15), the proportion of women workers to total employment is also expected to decline between those years (table 18).[58] Projected declines are relatively small in the military-industrial and consumer products categories, but rather sharp (from 50 per cent in 1961 to 41 per cent in 1970) in the manufacture of electron tubes. Tube manufacturing, moreover, is the only industry segment in which the absolute number of women workers is expected to fall between 1961 and 1970; the industry's anticipated expansion through the 1960's should result in increases in the absolute number of women workers in all other product categories.

In only one product category shown in table 18 -- components other than tubes -- is the proportion of women workers expected to increase during the 1960's even though, in this category as in the others, the proportion of production workers is expected to continue to decline. One reason for this difference in projections is that women are employed not only as production workers but also in clerical and other office jobs, and the projected trend in the proportion of office jobs is upward. A second reason lies in the marked trend toward microminiaturization of semiconductors and other components, which may give women an advantage over men in some types of assembly and other production-line work and as a result may increase the proportion of women production workers. This trend may be important also in the military and industrial field because of the increasing use in that field of microminiaturized components and circuits. This may help to explain why in that product category the projected drop in proportionate employment is expected to be less for women workers than for production workers.

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[57] Employment and Earnings, August 1962, pp. iv and viii.

[58] The projected decrease is from 41 per cent to 39 per cent. In 1950, women workers were estimated at 50 per cent of total electronics employment. The 1950 figure is not precisely comparable with those in table 18, but it provides a rough indication of the extent of change. 1950 estimate developed by U.S. Department of Labor, Bureau of Labor Statistics, on the basis of material from "Expansion in Electronics Employment," Monthly Labor Review, February 1952, and "The Effect of the Defense Program on Employment Outlook in Electronics Manufacturing," Occupational Outlook Handbook, Supplement No. 15 (Bureau of Labor Statistics), May 1951.

TABLE 15. NONPRODUCTION AND PRODUCTION WORKERS IN ELECTRONICS MANUFACTURING, BY PRODUCT CATEGORY, ESTIMATES FOR 1958-1961 AND PROJECTIONS FOR 1970

Product category and type of worker[1]	Number of workers (thousands)					Percent of employment in product category				
	1958	1959	1960	1961	1970	1958	1959	1960	1961	1970
Total electronics employment.....	609.8	689.4	734.1	777.7	1,084.5	100.0	100.0	100.0	100.0	100.0
Nonproduction workers	229.0	256.1	285.3	314.3	516.0	37.6	37.1	38.9	40.4	47.6
Production workers.............	380.8	433.3	448.8	463.4	568.3	62.4	62.9	61.1	59.6	52.4
Military-space and industrial-commercial products[2]................	331.9	353.0	380.1	409.0	645.2	100.0	100.0	100.0	100.0	100.0
Nonproduction workers..............	158.3	173.0	190.4	214.3	386.5	47.7	49.0	50.1	52.4	59.9
Production workers.................	173.6	180.0	189.7	194.7	258.7	52.3	51.0	49.9	47.6	40.1
Consumer products.....................	72.7	89.9	93.3	88.7	119.2	100.0	100.0	100.0	100.0	100.0
Nonproduction workers..............	19.0	22.7	24.5	23.8	33.3	26.1	25.2	26.3	26.8	27.9
Production workers.................	53.7	67.2	68.8	64.9	85.9	73.9	74.8	73.7	73.2	72.1
Components............................	205.2	246.5	260.7	280.0	319.9	100.0	100.0	100.0	100.0	100.0
Nonproduction workers..............	51.7	60.4	70.4	76.2	96.2	25.2	24.5	27.0	27.2	30.1
Production workers.................	153.5	186.1	190.3	203.8	223.7	74.8	75.5	73.0	72.8	69.9
Tubes.................................	79.6	89.2	87.6	88.8	80.0	100.0	100.0	100.0	100.0	100.0
Nonproduction workers..............	20.5	23.7	25.1	26.6	30.0	25.8	26.6	28.7	30.0	37.5
Production workers.................	59.1	65.5	62.5	62.2	50.0	74.2	73.4	71.3	70.0	62.5
Other than tubes......................	125.6	157.3	173.1	191.2	239.9	100.0	100.0	100.0	100.0	100.0
Nonproduction workers..............	31.1	36.7	45.2	49.5	66.2	24.8	23.3	26.1	25.9	27.6
Production workers.................	94.5	120.6	127.9	141.7	173.7	75.2	76.7	73.9	74.1	72.4

1) "Production and related workers" (referred to in this report simply as production workers), as defined by the Bureau of Labor Statistics include "working foremen and all nonsupervisory workers (including leadmen and trainees) engaged in fabricating, processing, assembling, inspection, receiving, storage, handling, packing, warehousing, shipping, maintenance, repair, janitorial and watchman services, product development, auxiliary production for plant's own use (e.g. power plant), and recordkeeping and other services closely associated with the above production operations."

2) Because of the form in which the source data were available, estimates could not be developed for the military-space category separately from the industrial-commercial category.

Note: Because of rounding, sums of individual items may not equal totals.

Source: Estimates and projections developed by United States Department of Labor, Bureau of Labor Statistics.

TABLE 16. ILLUSTRATIVE OCCUPATIONAL DISTRIBUTIONS IN ELECTRONICS MANUFACTURING, MILITARY-SPACE AND CONSUMER PRODUCTS, MID-1962

Occupation	Military and space products	Consumer products
	Percent	
Total employment	100.0	100.0
Nonproduction workers	60.0	30.0
Engineers and other technical workers	33.4	11.0
Engineers[1]	21.0	6.0
Technicians	7.7	3.0
Draftsmen	4.7	2.0
Administrative and executive[2]	13.2	12.0
Clerical and stenographic	13.4	7.0
Production workers	40.0	70.0
Skilled	12.6	6.8
Assemblers	5.2	--
Analyzers and troubleshooters	1.1	5.1
Processing workers[3]	.2	--
Machinists and repairmen	3.7	.3
Sheet-metal workers	.8	--
Tool and die makers	.3	.4
Welders	.6	.1
Carpenters	.2	.2
Electricians	.2	.2
Plumbers and pipefitters	.2	.1
Other skilled workers[4]	.1	.4
Semiskilled and unskilled	27.4	63.2
Assemblers	11.0	42.0
Inspectors and testers	3.1	14.4
Fabricating workers[5]	3.7	1.2
Processing workers[6]	3.1	1.2
Shipping and receiving workers	1.3	1.2
Material handlers, truckdrivers, and labourers	.3	2.2
Custodial and janitorial workers	1.5	.4
Other semiskilled and unskilled workers[7]	3.4	.6

1) Includes such occupations as electrical engineer, electronics engineer, design engineer, industrial engineer, mechanical engineer, value engineer, test and quality control engineer, and chemical engineer. The occupational distribution for military and space products also includes a small number of scientists, such as physicists, chemists, mathematicians, and metallurgists.

2) Includes such employees as managers and supervisors, foremen, salesmen, and personnel in purchasing, industrial relations, accounting, marketing, and advertising.

3) Includes such occupations as skilled electroplater and etcher.

4) Includes such occupations as stationary engineer, millwright, blacksmith, and skilled machine tool operator.

5) Includes such occupations as punch press, drill press, power brake, shear, and saw operator, grinder, and buffer.

6) Includes such occupations as spray and dip painter, oven tender, silk screen operator, plating machine loader, etching machine operator, degreaser, and cabinet retoucher.

7) Includes such occupations as stationary boiler fireman, machine setup man, relief operator, and cabinet repairman.

Source: United States Department of Labor, Bureau of Labor Statistics; based on information obtained through field visits to electronics establishments.

TABLE 17. WOMEN WORKERS AS PERCENT OF ALL WORKERS IN ELECTRONICS MANUFACTURING OCCUPATIONS, BY MAJOR PRODUCT CATEGORY, MID-1962

Occupation	Women as percent of all workers in occupation[1]		
	Military-space and industrial-commercial products	Consumer products	Semiconductors
All occupations	[2] 20-30	[2] 48	(3)
Nonproduction workers	15-16	18	(3)
Engineers	(4)	0	(3)
Technicians	8	0	(3)
Draftsmen	2	16	(3)
Administrative and executive	2	2	(3)
Clerical and stenographic	60	65	(3)
Production workers	25-45	45-60	70-72
Assemblers	50-90	80	90-100
Inspectors and testers	20-40	70	90-99
Processing and fabrication	25-30	(3)	65-90
Craftsmen	[4] - 2	0	0
Shipping and receiving	0- 6	(3)	(3)
Materials handlers, including truck drivers	0	(3)	(3)
Custodial and janitorial	7-14	0	5

---

1) Two figures given in a column indicate the range of the percents supplied by respondents; one figure indicates either that only one respondent supplied a percent figure or that more than one respondent furnished the same percent. Figures have been rounded slightly in some cases.

2) These figures, though based only on illustrative data from a few field visits, are consistent with estimates based on data published quarterly by the Bureau of Labor Statistics in its Employment and Earnings series, which indicate that in 1961 women represented 30 percent of all employees in the military-space and industrial-commercial products category and 49 percent in the consumer products category. (See Table 18).

3) Not available.

4) Less than 0.5 percent.

Source: United States Department of Labor, Bureau of Labor Statistics; based on information obtained through field visits to electronics establishments.

TABLE 18. MEN AND WOMEN WORKERS IN ELECTRONICS MANUFACTURING, BY PRODUCT CATEGORY, ESTIMATES FOR 1958-1961 AND PROJECTIONS FOR 1970

Product category and sex of worker	Number of workers (thousands)					Percent of employment in product category				
	1958	1959	1960	1961	1970	1958	1959	1960	1961	1970
Total electronics employment...	609.8	689.4	734.1	777.7	1,084.5	100.0	100.0	100.0	100.0	100.0
Men........................	357.9	399.9	428.4	458.0	661.6	58.7	58.0	58.4	58.9	61.0
Women......................	251.9	289.5	305.7	319.7	422.7	41.3	42.0	41.6	41.1	39.0
Military-space and industrial-commercial products[1].........	331.9	353.0	380.1	409.0	645.2	100.0	100.0	100.0	100.0	100.0
Men........................	231.0	249.2	268.7	288.3	463.3	69.6	70.6	70.7	70.5	71.8
Women......................	100.9	103.8	111.4	120.7	181.9	30.4	29.4	29.3	29.5	28.2
Consumer products.............	72.7	89.9	93.3	88.7	119.2	100.0	100.0	100.0	100.0	100.0
Men........................	36.9	44.7	46.6	45.7	62.6	50.8	49.7	50.0	51.5	52.5
Women......................	35.8	45.2	46.7	43.0	56.6	49.2	50.3	50.0	48.5	47.5
Components....................	205.2	246.5	260.7	280.0	319.9	100.0	100.0	100.0	100.0	100.0
Men........................	90.0	106.0	113.1	124.0	135.7	43.9	43.0	43.4	44.3	42.4
Women......................	115.2	140.5	147.6	156.0	184.2	56.1	57.0	56.6	55.7	57.6
Tubes.........................	79.6	89.2	87.6	88.8	80.0	100.0	100.0	100.0	100.0	100.0
Men........................	33.9	39.3	40.7	44.1	47.0	42.6	44.1	46.4	49.7	58.7
Women......................	45.7	49.9	46.9	44.7	33.0	57.4	55.9	53.6	50.3	41.3
Other than tubes..............	125.6	157.3	173.1	191.2	239.9	100.0	100.0	100.0	100.0	100.0
Men........................	56.1	66.7	72.4	79.9	88.7	44.7	42.4	41.8	41.8	37.0
Women......................	69.5	90.6	100.7	111.3	151.2	55.3	57.6	58.2	58.2	63.0

1) Because of the form in which the source data were available, estimates could not be developed for the military-space category separately from the industrial-commercial category.

Note: Because of rounding, sums of individual items may not equal totals.

Source: Estimates and projections developed by United States Department of Labour, Bureau of Labour Statistics.

WHY AEROSPACE NEEDS FLEXIBLE MEN (x)

AIRCRAFT MAKERS' SWITCH TO MISSILE AND SPACE SYSTEM PRODUCTION CALLS FOR MORE VERSATILE ENGINEERS AND TECHNICIANS, FEWER 'ONE-SKILL' WORKERS

At a Douglas Aircraft Co. aerospace plant in Southern California, a worker with the relatively humble title of "assembler" cuts, shapes, trims, aligns and fastens together the equipment he produces - and is something of an experimental mechanic as well. He works in a plant where, 20 years ago, Rosie the Riveter performed her single, repetitive, low-skill job all day long.

The change is only one of many that have transformed aerospace manpower requirements as the industry switched from aircraft to missile and space system production. Similar changes are in prospect for other industries that are moving toward a technologically advanced, research-oriented mode of operations. A case study of Douglas probably offers glimpses of the future for a great many other companies.

Structure reversal.

The most striking change at Douglas is the turnabout in labor structure, mirroring what has happened elsewhere in the industry. In 1951, the ratio of hourly production workers and technicians to engineers and scientists was 10.5 - 1. Five years ago it was about 3 - 1. Today it is 1.6 - 1.

In the Missiles and Space Systems Division, which accounted for about $400 million of the corporation's $750 million sales last year, the ratio of hourly production workers to engineers and scientists is 3 - 4. Nevertheless, production workers are still on top by a 3.5 - 1 margin in the Aircraft Division.

During this period, Douglas' total employment grew from 44,000 at the end of 1951 to a post-Korea high of 80,400 in 1956, then dropped to the present level of 38,200. Size of total employment, however, is more a measure of a company's success in landing major contracts than a measure of changing technology. Total aerospace employment in the United States today is less than 100,000 below the 1953 level of 795,000. It peaked at about 900,000 in 1957.

More versatile.

The hourly production worker not only is rarer; but where he survives, he's both more skilled and more versatile. The rigid tolerances and quality control requirements of spacecraft demand the first characteristic, its "custom-made" nature the second.

"It's prudent to employ people with a number of skills, so you can move them around. Spacecraft work is made-to-order, and we just don't have long assembly lines with single jobs to be performed," says an aerospace company official.

(x) From Business Week, June 22nd 1963

More training.

The trend to versatility is confirmed - and encouraged - by Ernest White, regional vice-president of the International Association of Machinists, the major union at Douglas. The other major union in aerospace is the United Auto Workers.

I.A.M. urges its members to take advantage of special training programs in electronics, computing techniques, and other specialties, White says. Veteran machinists in aerospace have had to adapt to new materials, new processes, and new tools. Of necessity, they are a versatile lot today, White says.

For example.

Two figures illustrate his point. In 1943, over 50 per cent of I.A.M.'s aerospace members were riveters. Today the percentage is less than 5 per cent.

White believes the trends to more skilled and versatile workers, and to shorter production runs, are creating a more stable labor force. If so, companies and unions will welcome it.

Most 20-year men in aerospace have worked at every major plant in the area at one time or another, shifting with the work load as first one company then another won or lost defense contracts. Right now, a sizable number of skilled machinists laid off by General Dynamics Corporation commute each week from San Diego to Los Angeles and even to the big Lockheed Aircraft Corporation's missiles and space plant at Sunnyvale, about 40 miles from San Francisco.

White reasons that more broadly skilled workers will be able to shift from job to job within a single company. Meanwhile, seniority rules often give laid-off workers first crack at new job openings, with the result that "new" hires are likely to be old-timers returning for a second or even third term of duty with a given firm.

Thus, when Douglas begins to hire some 5,000 production workers at Long Beach for the D.C.-9 transport, most of the men and women will come from seniority lists of persons laid off earlier by Douglas.

Deeper into electronics.

The same space age needs that have drastically slashed demand for riveters, assemblers, fabricators, jig builders, template builders, and foundry workers have generated it for electronics technicians, a type of hourly rated worker who's more likely to wear a white smock than coveralls. Also in demand are solderers, who must pass rigid government-administered tests, and certain types of complex machine tool operators.

Most companies that once were airframe producers are now deep into electronics, so electronic assemblers are also needed. Finger dexterity is the most important qualification for this work, performed almost exclusively by women.

Pay scales rise.

As skill levels go up, so do pay levels. The technical school graduate who began at Douglas as a sheet metal assembler in 1953 earned $ 1.80 an hour. Today the youngster out of technical school may begin work as an electronic systems checker at $3.10 an hour. The average weekly wage of aerospace workers has leaped from $68.39 in 1950 to $117 at the end of 1961, according to Aerospace Industries Association. In Southern California, the weighted average of I.A.M. aerospace workers is $2.84 an hour.

Union membership has taken a beating in the switch from production workers to engineering personnel. I.A.M. had 25,000 members at Douglas in 1953. Today it has 12,000 plus 1,000 workers who pay dues but don't hold membership cards under an agency shop provision.

Woman's place.

The percentage of women employees in aerospace has remained level, at about 15 per cent of the total, ever since it dropped from its wartime peak of one-third of the work force. But the jobs filled are different. Today's woman worker is more likely to be a report typist than a production worker. Industry rule of thumb says 200 new clerical persons are needed to support every 1,000 engineers and scientists hired, while only a few clerks were needed for each 1,000 production workers.

Campus look.

Douglas facilities show the impact of changing technology and manpower needs. A new space research and manufacturing facility being erected at Huntington Beach, California, will use only 20 per cent of the first 700,000 sq. ft. of floor space for manufacturing - almost a complete reversal of the usual World War II formula of 90 per cent manufacturing space to 10 per cent for engineering and administration.

Senior scientists and engineers will walk only a few steps to their offices from convenient parking spots at the new facility - part of a determined attempt to attract professional personnel, according to J. Curtis Counts, director of employee relations. Douglas also is planting masses of trees and flowers.

The trees and flowers are a necessity because top-grade scientific and engineering people simply won't listen to job offers if they will have to work in a "bullpen" atmosphere, Counts says.

White-collar pay.

Like the flora, salary rates have shot up luxuriantly for engineering-scientific personnel. Douglas pays newly hired persons with B.A.s right off the campus $600 a month, compared with $295 in 1951. Those with M.S.s start at $725, compared with $385, and Ph.D.s begin at $950 compared with $463.

This kind of salary scale makes organizing hard for the Southern California Professional Engineering Association, an independent engineers union with 1,300 members at Douglas. This is roughly a quarter of the 5,500-man bargaining unit, which includes 4,500 engineers and 1,000 engineering technicians. Membership peaked at 2,200 three years ago, when management announced a 10 per cent salary slash.

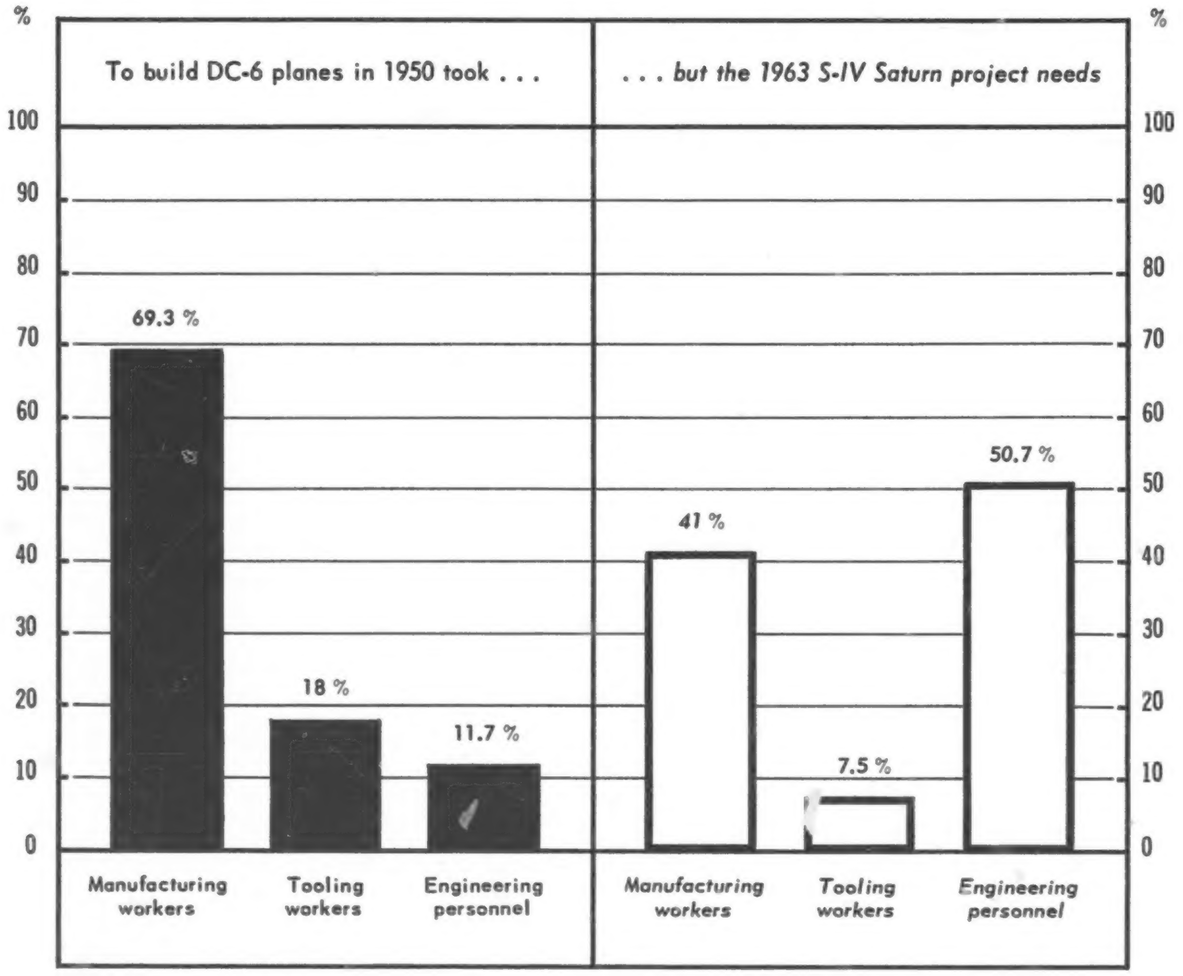
Unions lose.

SCPEA representative Michael Tarr also complains that potential members don't seem to care about unions, rove from company to company and frequently get promoted out of the bargaining unit into supervisory jobs. Douglas' recent reorganization into project management resulted in a lot more supervisors, some of them at relatively low salaries, he says.

Of 440 new members signed up in 1962, 390 quit, were laid off, got promoted, or otherwise disappeared - leaving a net gain of 50 members, he says.

The union's top classification is senior engineer, with a monthly range of $1,383 to $1,838. Median pay for professionals is $851 a month, median pay for technicians $2.94 an hour.

HOW DOUGLAS' LABOR NEEDS HAVE CHANGED



DOUGLAS' ENGINEERING JOBS HAVE CHANGED, TOO

Engineering and scientific assignments	Per cent of work force	
	1953	*1963*
Aerodynamics and astrodynamics	8 %	*18 %*
Structural	29	*10*
Mechanical	17	*11*
Structural-mechanical	13	*2*
Propulsion	6	*6*
Electronics	20	*31*
Computing	5	*16*
Life sciences	2	*2*
Nuclear	0	*2*

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DEFENSE-AEROSPACE: WHAT IT MEANS TO CALIFORNIA(x)

The defense-aerospace sector serves as an excellent example of the way in which technology, coupled in this case with changes in national defense requirements, can affect not only an industry, but an entire economy.

National defense is of vital concern to all Americans for the fundamental security it provides the country, and to Californians, especially, for the important part defense industries play in the State's economy. In the past quarter century, both the composition of the defense sector and its contribution to the national economy have changed substantially. In 1939 federal expenditures for defense amounted to $1.1 billion, only 1 per cent of G.N.P. Expenditures in 1963-64 were more than $55 billion, nearly 9 per cent of G.N.P. During this period, regions characterized by favorable climate, diversity of highly specialized industry, extensive markets, and access to a large pool of technical personnel in educational institutions and private firms became exceptionally important to defense firms. California was the one state able to meet all these requirements and as a result quickly took the lead in attracting defense-oriented business.

California's defense-aerospace sector, for which data are available on both a state basis and for metropolitan areas, includes aircraft, ordnance (the vital missile industry), electronics, and instruments. With employment currently at 473,000 these industries represent 35 per cent of all manufacturing employment, and 8 per cent of total nonagricultural wage and salary workers, or one out of every twelve such workers employed in nonagricultural activities. Wage and salary payments to this group reach nearly $3.5 billion annually, approximately 7 per cent of the State's personal income. In more comprehensive terms, persons employed in private shipyards engaged in government work, in government installations - from naval yards to hospitals and bases - and in research and development firms under the service classification must also be included. Addition of people in these categories would raise California defense-aerospace employment to 650,000. Impressive as these data are, they still exclude the jobs created in services, trade, construction, and other industries which are needed to meet requirements of defense industry workers for general goods and services.

DEVELOPMENT OF THE DEFENSE-AEROSPACE INDUSTRY

The present California defense industry complex is a post-World War II development. At the end of the war, defense was concentrated in shipbuilding and repairing and conventional aircraft production. Defense firms at that time accounted for under 100,000 employees, less than 15 per cent of state wide manufacturing employment. Subsequent years saw the rapid expansion of electronics and missiles, and relative contraction of ship construction.

The industry developed principally in Los Angeles, Orange, Santa Clara, San Diego and Sacramento counties. In the Los Angeles, Orange County, and San Jose areas, electronic firms were established to meet demands from aircraft producers for highly specialized parts and, eventually. research and development projects, thus forming the nucleus for a space research and development center. Of the 473,000 Californians in defense and aerospace manufacturing as of December 1964, approximately 276,000 (58 per cent) were in the Los Angeles area; 54,000 (11 per cent) in Orange County; 32,000 (7 per cent) in San Diego. The remaining 111,000 (24 per cent) were scattered in other areas. Employment trends from 1950 to 1964 are summarized in Table A.

(x) From Economic Report of the Governor 1965, transmitted to the California Legislature, March 8th 1965.

TABLE A

EMPLOYMENT IN CALIFORNIA AEROSPACE MANUFACTURING INDUSTRIES

	Wage and salary workers (thousands)			*Annual average percent change*		*Percent of total manufacturing in designated locality*		
Industry and locality	*1950*	*1958*	*1964*	*1950–1958*	*1958–1964*	*1950*	*1958*	*1964*
Total	**131.4**	**417.8**	**483.9**	**15.6**	**2.5**	**17.3**	**34.3**	**34.8**
By Industry								
Aircraft	**85.7**	**230.6**	**163.7**	**13.2**	**—5.6**	**11.3**	**18.9**	**11.8**
Ordnance	**0.7**	**43.4**	**99.4**	**67.5**	**14.8**	**0.1**	**3.6**	**7.1**
Electrical equipment	**29.5**	**123.3**	**192.9**	**19.6**	**7.7**	**3.9**	**10.1**	**13.9**
Instruments	**15.5**	**20.5**	**27.9**	**3.6**	**5.3**	**2.0**	**1.7**	**2.0**
By Locality								
Los Angeles County	105.1	285.1	281.9	14.0	—0.2	24.9	40.7	37.7
Orange County		13.4	52.4		25.5		40.1	57.6
San Diego County	**15.2**	**53.8**	**34.8**	**17.1**	**—7.0**	**61.5**	**80.1**	**68.1**
Santa Clara-Sacramento Counties	**2.9**	**30.8**	**67.3**	**34.4**	**13.9**	**9.5**	**42.3**	**57.5**
Rest of State	**8.2**	**34.7**	**47.5**	**19.7**	**5.4**	**2.9**	**10.1**	**12.5**

Source: California Department of Industrial Relations, Division of Labor Statistics and Research.

CHARACTERISTICS OF DEFENSE MARKETS

Defense industries have only one major buyer, the Federal Government, primarily through the Department of Defense (D.O.D.) and the National Aeronautics and Space Administration (N.A.S.A.). Competition among producers in the designing of major weapon systems is therefore intense. Although there are many defense producers, the five largest in the United States receive over 23 per cent of all D.O.D. prime contracts and the 100 largest 74 per cent of D.O.D. prime awards and 88 per cent of N.A.S.A. awards.

The market structure has developed from the unusual buyer-seller relationship and the type of product involved. Government requests for major project design lead to general research and development (R & D) expenditures by many major firms in an effort to obtain final project contracts. Following eventual contract award, manufacturing problems involve additional R & D work, which leads, in turn, to further projects. Only by continued advances in technology - including, particularly, product innovation and resource utilization - can producers retain leadership among the many firms in the face of rapidly changing defense requirements. In addition, lead time between product planning and delivery is of vital importance. Rapid technological developments often result in product obsolescence before delivery can be made. However, cancellation occurs more frequently on projects in the design stage than for established systems, upon which modifications can be made. An additional aspect resulting from the demand situation is the shift from bid and cost-plus procedures to negotiated product pricing and fixed-price contracts, a change brought about by more efficient federal budget administration.

The industry is by no means static. Individual firms are oriented to different defense functions, so that changes in military procurement patterns frequently cause sudden shifts in prominence from one firm to another. General Motors, number one military contractor in the early 1950s when emphasis was on tanks and trucks, dropped to 20th by 1960. Curtiss Wright, largest producer of World War II aircraft, was in 45th place by 1960. In the early postwar years, emphasis was on aircraft production; missile development is now leading.

California firms dominate several of these sectors. The State receives approximately one-fifth of all defense outlays and 50 per cent of N.A.S.A. space-related awards and nearly 40 per cent of military prime contract awards for research and development work. Missile contracts alone account for over 50 per cent of all military prime contracts awarded to California firms and include one-third to one-half of all funds allocated to research and development. Aircraft, the second largest California defense industry, takes some 14 per cent of all defense contracts coming to the State.

Emphasis on research and development, particularly in the California aerospace industry, has created an unusual employment structure. According to latest available data, 25 per cent of the scientific and engineering personnel in private industry are in the aircraft-missile and electronic sectors. This concentration may be altered, however, by recent incentive programs which award bonus payments to companies successful in overall cost reduction efforts.

Table B compares 1963 employment distribution by occupation for national defense industries and all manufacturing.

Pressures to hold down federal spending have resulted in the tapering of national defense outlays. Funds available for research and development work appear to have leveled off at around $6.5 billion. Procurement has dropped substantially from 1963 levels, while operations and maintenance expense and military payrolls continue to rise slowly. Ordnance firms have been hardest hit, with employment in California down 13 per cent between December 1963 and December 1964.

In terms of aerospace manufacturing employment, San Diego has seen the most severe cutbacks, with an 18 per cent drop in jobs. Sacramento and San Jose combined were down by more than 12 per cent and Los Angeles by 5 per cent. The balance of the State showed a decline of 1 per cent. Table C presents data for the major defense-manufacturing regions in the State.

OUTLOOK FOR DEFENSE SPENDING

Analysis of probable defense expenditures must start with basic assumptions regarding world political and military situations. For this review the following have been made:

(1) No significant change in present world tensions;

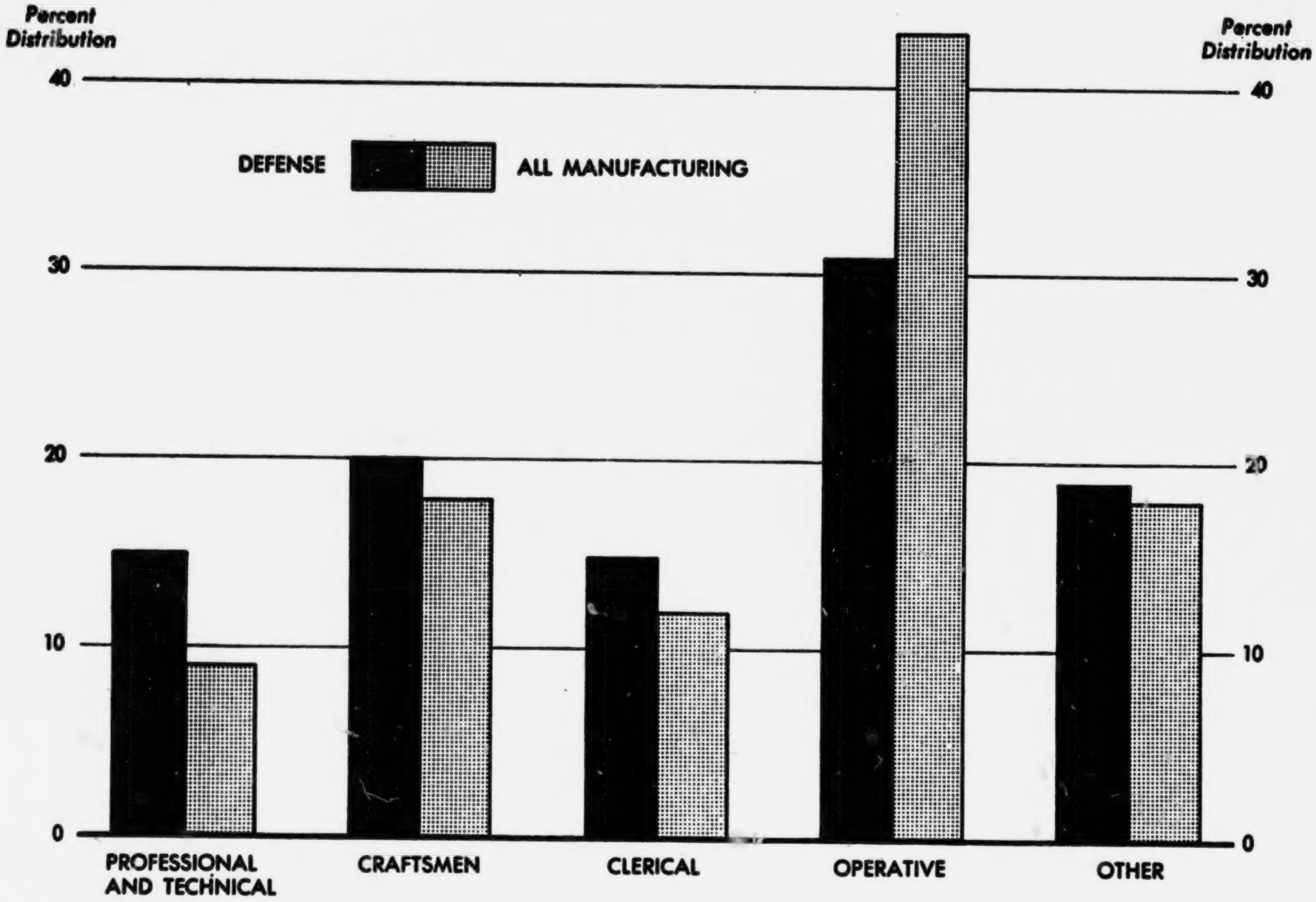
(2) No further cuts in weapon or aircraft procurement in the light of present military action in Southeast Asia;

(3) Selective cuts in space expenditures to channel funds to rapid development of the Apollo-Saturn V-Gemini projects.

These assumptions would indicate some cutbacks in R & D spending, but continuation of

TABLE B

DEFENSE INDUSTRIES REQUIRE A LARGER PROPORTION OF PROFESSIONAL, SKILLED, AND CLERICAL WORKERS THAN MANUFACTURING AS A WHOLE



Data for 1963
Source: U.S. Bureau of Labor Statistics

TABLE C

CURRENT TRENDS IN AEROSPACE MANUFACTURING EMPLOYMENT

	Wage and salary workers (Thousands)			*Percent change*	
	Dec. 1962	*Dec. 1963*	*Dec. 1964*	*Dec. 1962– Dec. 1964*	*Dec. 1963– Dec. 1964*
California					
Total	526.8	505.4	472.9	—10.2	—6.4
Aircraft	174.4	170.9	161.4	—7.5	—5.6
Ordnance	102.2	106.0	92.5	—9.5	—12.7
Electrical equipment	222.6	200.3	190.5	—14.4	—4.9
Instruments	27.6	28.2	28.5	3.3	1.1
Los Angeles County					
Total	311.9	292.0	276.3	—11.4	—5.4
Aircraft	122.2	119.0	115.3	—5.6	—3.1
Ordnance	46.6	49.8	45.1	—3.2	—9.4
Electrical equipment	123.8	103.5	96.4	—22.1	—6.9
Instruments	19.3	19.7	19.5	1.0	—1.0
Orange County					
Total	52.7	54.4	53.9	2.3	—0.9
San Diego County					
Total	41.7	38.9	32.0	—23.3	—17.7
Santa Clara–Sacramento Counties					
Total	71.1	72.2	63.1	—11.3	—12.6

Source: California Department of Industrial Relations, Division of Labor Statistics and Research.

present levels in military personnel and acquisition of conventional weapons. The State's position relative to other areas probably will decline, however, as awards to new defense centers in other states increase. Completion of missile systems, now on an operational basis, is another important consideration in the outlook for California's defense industries. The stimulus which the development and construction of these systems provided to the State's economy has been eliminated. At the present time new projects, including antimissile and antisubmarine weapons, are in preliminary design stages, and of little value as a business booster.

INDUSTRY DIVERSIFICATION

Defense firms have recognized their vulnerability to shifts in military strategy or weapon emphasis for many years. Readjustment problems developed at the end of World War II and the Korean conflict, and were met with attempts to lessen dependence on military contracts. In some cases, pent-up consumer demands and shortages of productive capacity permitted rapid shift from defense to nondefense production. For individual firms, however, particularly those oriented to major weapons, the results of such efforts were generally not successful. Aircraft companies undertook to diversify by going into the production of such items as aluminium canoes, artificial hands, stainless steel caskets, and parts for musical instruments. These proved to be marginal at best, and were eventually abandoned. Another measure involved diversification by acquisition of consumer-oriented firms turning out such products as motion picture equipment, prefabricated houses and buses. However, such actions represented largely the purchase of ownership interests in unrelated firms and did not utilize existing physical resources of military producers.

Success in diversification will depend to a large extent on three factors: the type of product, the proportion of final demand going to civilian versus military buyers, and the government's policies to ease the effects of spending cutbacks. Subcontractors in the electronic field may encounter fewer problems, as their output is already varied and adaptable to consumer uses. Somewhat greater problems will be posed for such businesses as machine shops and plating firms, which lack capital and R & D facilities to create new products. For the major companies engaged in developing weapon systems, the transition appears to be difficult. Military purchases account for over three-fourths of the sales of some contractors. Missile components have no counterpart in the private market. In addition, it will be extremely difficult to adapt high-precision equipment to production of consumer or industrial goods. However, aerospace companies are continuing research into potential consumer fields, although results so far have been negligible considering the amount of resource reallocation which will be necessary.

Personnel currently employed by defense firms present a particular problem. As noted above, defense firms hire a large portion of the scientists and engineers in the State - men who have extensive knowledge of weaponry and space technology.

Economists have already suggested numerous ways in which federal and state governments might mitigate the effect of defense expenditure cuts. To a large extent these approaches would maintain research and development facilities and stimulate nondefense projects. Among the solutions proposed are:

(1) Government awards for large amounts of nondefense R & D;
(2) Long-term loans and loan guarantees for commercial R & D;
(3) Joint industry-government financing of commercial R & D;
(4) Tax credit for commercial R & D;
(5) Commercial product planning treated as an allowable cost on defense contracts;
(6) Lease of government-owned plant and equipment on attractive terms for commercial use;
(7) Increased profitability of defense contracts to raise corporate funds available for investment in diversification efforts; and
(8) New or increased nondefense procurement programs for such projects as area redevelopment, urban transportation, automobile safety and oceanography.

Arguments can be presented for and against each of these measures. Briefly, objections are raised on the grounds that Federal Government subsidies for R & D expenditure are not an appropriate government sphere of action and would grant unfair advantage to recipient firms. They could result in technological advance without the assurance of nondefense application, and might even encourage capital investment in the defense sector. Supporters contend that incentives to turn resources to nonmilitary production would lessen deflationary tendencies and the unemployment resulting from defense cutbacks.

It appears that both sides have merit. In undertaking such measures, however, care would have to be exercised to prevent launching projects of a mere make-work variety which would not necessarily benefit consumers or create additional economic opportunities.

Other proposals involve personal and corporate tax reductions, increased government expenditures for goods and services proportionate to the reductions in armaments expenditures, and stepped-up transfer payments. These would provide general economic stimulus, but would not attack the immediate problem of directing human and material resources to nonmilitary production. In states such as California, which have a high concentration of defense firms, the more direct methods are clearly preferable.

California has already initiated a program designed to turn the State's R & D resources to the solution of pressing social needs by utilizing the skills of personnel in the defense-aerospace industries. Last November Governor Brown called for bids from the aerospace industry to work out development programs in the areas of transportation; sanitation and waste management; management of California's criminals and delinquents; and the collection, storage, and retrieval of economic and social data. System engineers were asked to outline proposals for studies in each of the four areas.

In the transportation field there is need for a complete state network capable of accommodating people, materials and merchandising efficiently not just ten years from now but 30 to 50 years in the future. The study will estimate the cost of such a system, assign financing responsibilities, and indicate the most effective means of control.

Similarly, the study of modern waste management systems will design a program to prevent the pollution of air, land and water. Present systems have been developed piecemeal over many years, and will soon be inadequate to serve the needs of the growing metropolitan areas.

Another study will cover the early detection, management, diagnosis and rehabilitation of the criminals and delinquents in our population. It is believed that this research holds promise of leading to sharp reductions in costs and at the same time providing sounder means of handling these problems of our modern society.

The fourth study will devise methods to facilitate information collection, storage and use by governments and private enterprises. The quality and complexity of available data are increasing rapidly, as detailed information is more and more frequently required in arriving at rational conclusions. Efficient analysis of vast amounts of data has therefore become essential both for research work and for informed management decisions.

Although a limit of $100,000 was placed upon the cost of each study, the State's request for proposals in these four fields resulted in 50 separate bids: 18 to outline the transportation study, 13 to formulate the data collection and retrieval system, 12 to study problems of waste management, and 7 to delve into the field of criminal control. These proposals have been evaluated and a contract let for each of the four studies.

ECONOMIC LOCATION

Basically, the solution to the social problems created by technological change in California lies in job creation. This involves diversifying the economy, stimulating demand, expanding purchasing power and developing essential work skills. At the present time, employment slack is taken up largely by two sectors; state and local governments; and services, including trade, finance-insurance-real estate, and other business and personal services. Each continues to expand with population growth. However, even these rapidly growing sectors cannot - and for well-balanced economic growth should not - absorb the entire labor surplus.

EXTRACTS FROM REMARKS BY P.L. SIEMILLER, INTERNATIONAL PRESIDENT, INTERNATIONAL ASSOCIATION OF MACHINISTS, AT DEPARTMENT OF DEFENSE ADVANCED PLANNING BRIEFING, SAN FRANCISCO, CALIFORNIA, APRIL 13 1966

..... I intend to discuss some specific problems in the aerospace industry. By aerospace I mean specifically those companies and corporations that produce aircraft, missiles, and related components. It is an industry with which the I.A.M. has a particularly close connection. We represent - and bargain for - two-thirds of all organized aerospace workers.

..... In aerospace the I.A.M. objective has been to achieve - for our members - wages, working conditions and fringe benefits that are at least comparable to those in other, less critical, industries.

This objective has not been easy to achieve ..... because certain conditions exist in aerospace that undermine the process of collective bargaining in this industry.

The first of these conditions is rooted in the basic insecurity of aerospace employment. Over the long run - and for the industry as a whole - aerospace is a growth industry. But for the workforce in any particular locality the experience has been one of boom or bust, feast or famine, employment that goes up like a sky-rocket one year and down like a depth charge the next.

Often these conflicting trends come simultaneously. There will be a shortage of skills in one locality and a surplus in another. Right now for example the government is helping companies on the West Coast relocate craftsmen who have been stranded by previous aerospace phaseouts on the East Coast.

But many who are being so frantically recruited today will be without jobs again tomorrow. According to the Wall Street Journal the phaseout of several major hardware projects related to our moon shot will result in 40,000 lay-offs in aerospace within the next 12 to 18 months.

Aerospace workers say they live from contract to contract. Some even half jokingly referred to themselves as migrants. Like those who follow the crops - they follow the contracts.

This situation is not only rough on the people involved, it is also wasteful, expensive and time consuming.

Once a skilled workforce has been scattered to the winds it takes money to recruit a new one. It takes time and money for training. Either directly or indirectly the government bears these costs. But a greater cost is paid by the aerospace workers themselves. It is their income that is interrupted. It is their lives that are uprooted. It is their mortgaged homes that are often lost.

Perhaps it is not possible to smooth out all the peaks and valleys of aerospace employment. This is an industry in which a missile or a plane can become obsolete before it leaves the drawing board. It is an industry in which the purchasing decisions of the largest customer - the government - are subject to political considerations. It is an industry in which the military may propose and the White House may veto. Or the military and the White House may request - but Congress may deny - appropriations.

So there will always be a certain amount of insecurity in aerospace. But I submit that the Department of Defense and industry could both do more to moderate the endless cycle of boom and bust that keeps the aerospace workforce in a state of chronic insecurity.

The 50 billion dollars which the Department of Defense spends each year represents half of the federal Government's total expenditures. This is not only a lot of money but it is a lot of responsibility.

We know the department engages in many kinds of long-term planning. Spokesmen for the aerospace industry have suggested at earlier briefing sessions that within the limits of national security they need timely access to these long-range plans in order to develop their plans.

I am suggesting that the unions representing workers in the aerospace industry also have a right to know the direction of defense planning. We have a right to make suggestions as to how the Department of Defense can synchronize military necessity with social need. We have a right to expect that there be planning for people as well as for production.

INTER-AREA RECRUITMENT FOR AEROSPACE (x)

by Veva V. Babb and John C. Kane

The Boeing Company's mid-December 1965 announcement of increased jet transport production and facilities expansion - involving the hiring of more than 15,000 additional workers during 1966 - ushered in a year which promises the heaviest aerospace involvement in the history of Washington State's Interarea Recruitment Section. The additional manpower required will increase the company's annual payroll in the Seattle area by about $125 million according to the company president.

Reminiscent of the days of World War II, plans for acquiring professional and production workers for aerospace will assume the proportions of an immense "pipeline" operation, extending into every area of the United States. The company plans to add employees at the rate of about 1,500 a month and has begun accelerated hiring to meet its requirements.

Shortage of Skilled Technicians

The company will need some 4,000 professional-technical people, in addition to machinists, tool fabricators, tool-and-die makers, assembly mechanics, inspectors, tool designers, tool and production planners, and other skills.

This number of skilled, trained workers is not available in the State. Special Manpower Development and Training Act training will be provided through facilities which Boeing will establish. A heavy recruiting schedule is already under way.

Since aerospace manpower requirements have dominated interarea recruitment activities in Washington for some time, the Boeing announcement did not catch the Employment Service unprepared.

The practical working knowledge of aerospace requirements, hiring criteria, training programs, and changing manpower patterns gained over recent years will prove invaluable as we "retool" for the accelerated recruitment effort. Shortage occupations in the aerospace industry will undoubtedly continue to grow as current manpower projections are translated into critical manpower requirements.

For the past several months, major hard-to-fill openings in interarea recruitment have been largely for aerospace, including engineers, computer analysts, production illustrators, tool designers, research technicians, stress analysts, weight analysts, research laboratory analysts, cost estimators, programers, engineering aides, machinists, sheet metal workers, plastic form builders, pattern casters, template makers, tool fabricators, electronics mechanics, machine operators, and final assemblers. Occupational shortages have intensified for machinists, machine tool operators, and engineers - categories in great demand for many industries.

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x From "Employment Service Review", April 1966

OJT and MDTA Training Increased

Intensified interarea recruitment efforts have been accompanied by a substantial increase in on-the-job training (OJT) programs within aerospace. Institutional training under the Manpower Development and Training Act (MDTA) has supplemented OJT training with classes for airplane inspectors, production storekeepers, mockup assemblers, production electricians, tool fabricators, mechanical draftsmen, subassemblers, and final assemblers. To date, these MDTA institutional programs have graduated 4,582 trainees from aerospace-related courses.

As a result of the tightening job market, where professional, skilled, and semiskilled people are at an all-time premium, the aerospace industry has relaxed its experience and educational requirements for entry workers and trainees alike. The high school diploma has been eliminated as an educational requirement for aerospace manufacturing helpers. A general relaxation of experience requirements for nonapprenticeable skilled and semiskilled occupations is apparent in all industries - but principally in aerospace.

Interarea recruitment figures since 1964 reflect the rapid developments in the aerospace industry. From 562 interarea openings for aerospace in December 1964, the total rose to 3,393 in December 1965. Similarly, during calendar year 1964, 27 positive recruitment man-days were arranged for the Boeing Company. The number jumped to a total of 445 days during 1965, with two recruiters involved in most of the positive recruitment efforts.

Initially, trainee selection and referral were confined to the Seattle metropolitan area, where there were sufficient numbers of unemployed individuals with suitable qualifications for training in the various occupations needed. However, by the spring of 1965, needs for skilled manpower began to snowball. Compounding the situation was a general advance of the entire economy of the Seattle metropolitan area and a corresponding rise in job opportunities. Filling MDTA class sections with qualified trainees became a definite problem.

To insure adequate recruitment for class sections, a number of steps were taken. Despite intensive efforts by the local offices in the Seattle metropolitan area, this area could not supply an adequate number of trainees. Openings for trainees were then placed in statewide interarea recruitment.

As the magnitude of the training effort mounted, a coordinator for aircraft training projects was appointed to coordinate local office recruitment efforts and to maintain liaison with the various training facilities and others. In addition to relieving the pressure on selection and referral officers in order-holding offices, the coordinator has been able to function most effectively in a troubleshooting role, moving promptly to clear unforeseen bottlenecks. After careful analysis of the available labor in each local office area, firm minimum recruitment quotas were assigned to all local offices. This clarification of responsibility proved most effective in harnessing the referral power of each local office, with the various selection and referral officers being able to project their planning on an assured basis.

As further aid in trainee recruitment in aircraft occupations, various visual aides were developed. Several sets of colored slides depicting a sequence of actual job duties and employment environment for different occupations, including a synchronized sound track, were produced by Boeing and loaned to the Department for use by local offices to stimulate applicant interest. One selection and referral officer developed a letter detailing existing opportunities for training and remunerative employment after successful completion of training. This letter, inviting application, was addressed to a number of apparently qualified individuals in the active file and resulted in a substantial percentage of good referrals. This idea was made available to each local office in the State.

Newspaper and television publicity will continue to be used for recruitment. In addition to unannounced spot appearances in newscasts, personnel from the Employment Service and from the State Board for Vocational Education have appeared in a number of regularly scheduled television programs, explaining and promoting the training effort. Some of these programs have been panel discussions; others were illustrated with film or slides. One local office constructed a sign promoting the training opportunities for aerospace jobs and attached it to the mobile unit serving the agricultural needs of the area, thus assuring widespread public exposure.

As the needs for qualified workers increased and the shortage became more acute, employers' hiring requirements for some aircraft entry jobs were adjusted through Employment Service efforts, and the formal education requirement was lowered to the eighth grade. This breakthrough permitted the enrollment of a number of graduates of the MDTA basic education and work-orientation course conducted in the Seattle area. It also enabled the selection and referral officers throughout the State to work with a much greater proportion of the unemployed in their areas and opened the door of opportunity to employment through training to many more workers.

Hiring Specifications Lowered

An interesting sidelight of the all-out recruitment effort was the arrangement made by the Employment Service for a number of enrollees from one of the Job Corps centers in Washington to apply in a body for aerospace employment. Of the 15 who applied, 9 have been hired and the other 6 are awaiting assignment. All Washington Job Corps centers have been contacted and a continuous recruitment program is planned.

Throughout 1965, in order to meet pressing manpower needs, Boeing conducted a nationwide positive recruitment campaign through the facilities of the Federal-State Employment Service. State Employment Service offices involved in this cooperative effort covered the length and breadth of the country.

Installation of a telex communication unit in the Seattle office provided direct, almost instantaneous, connection with 15 other main stations throughout the United States and has been of inestimable value in recruiting. In the past, this activity was aimed at professional job openings and did not furnish the immediate interchange of information regarding the availability of the types of skilled workmen so desperately needed by the aerospace industry. However, recent changes in the use of this system whereby it can now be used for skilled and semiskilled job openings will do much to enhance the nationwide recruitment of shortage category personnel.

Unemployed Are Not Skilled

The difficulty encountered by this Department in attempting to help The Boeing Company meet its manpower shortages is attributable to the developing tightness of the job market. As of January 15, 1966, Washington's statewide average rate of unemployment was 4.7 per cent. However, the skills of the unemployed work force, regardless of locality, are well below those required by the aerospace industry.

The lack of sufficient numbers of trained and qualified workers will, at least in the foreseeable future, continue to plague the aerospace industry. In addition to stepped-up interarea recruitment activities, all facets of the vast recruitment program - involving the hiring, training and retention of sorely needed workers - will continue to need more and more attention from industry, educational institutions, and government to provide effective manpower support to an essential industry.

EMPLOYMENT EXPERIENCE OF DISCHARGED DEFENSE WORKERS(*)

by Robert Brandwein
of the Economics Bureau,
United States Arms Control
and Disarmament Agency.

Challenging the prevalent view that defense workers are so specialized that they can work only for defense contractors, a Washington (State) Employment Security Department study revealed that laid-off defense workers found new jobs in a variety of nondefense occupations. Laid off by Boeing Co. of Seattle because of the cancellation of the Dyna-Soar manned spacecraft program, workers found new jobs in transportation and wholesale and retail trade as well as government, real estate, finance, and nondefense manufacturing.

The reemployed worker reported(1) that his own direct application was the most successful method of obtaining a new position, indicating(2) a serious deficiency in the operation of institutional job-seeking arrangements. Public and private employment agencies, unions, and professional organizations played only a minor role in finding jobs. Eight months after the bulk of the terminations had occurred, 30 per cent of the surveyed employees were still unemployed.

FINDING EMPLOYMENT

On 9th December, 1963, the Department of Defense announced the cancellation of the Dyna-Soar project, and 5,229 employees at the prime contractor, Boeing, were identified by company officials as being subject to layoff because of the termination. The State Employment Security Department undertook to study the employees who were affected, their post-layoff experience, their approach to seeking reemployment, and the assistance they received in their search.

As of 15th May, 1964, 36.7 per cent of the men and 69.1 per cent of the women surveyed were unemployed. By August, the situation had improved, but 22 per cent of the men and 59.4 per cent of the women were still out of work; the average length of unemployment was 14.3 weeks for men and 23.4 weeks for women. Different groups and occupations had varying degrees of unemployment: professionals averaged 12.3 weeks of unemployment, men over 55 years of age averaged 21 weeks. The younger the worker and the more education attained, the shorter the period of unemployment.

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(1) On 15th May, 1964, questionnaires were sent to 5,229 employees identified as subject to layoff because of the Dyna-Soar termination. The 2,854 men and 904 women (72 per cent of the mailing) responding to the questionnaire were polled on 15th August, 1964, about their labor force status at that time. The response rate was 77 per cent for the August form. The tabulation and interpretation of the questionnaires were performed by the State of Washington Employment Security Department under a contract sponsored by the Department of Defense and the U.S. Arms Control and Disarmament Agency.

(2) Conclusions in this article are tentative statements based on information obtained from only one survey of displaced defense workers. Similar studies are underway in the Long Island and Denver areas and it is anticipated that greater statistical detail and analysis of the manpower policy implications of these three comparable studies will be published at a later date.

(*) from "Monthly Labor Review", October 1965

A large number of workers (73 per cent) indicated a willingness to acquire new skills or to take refresher courses other than entry training. The number and distribution of persons in training by type of program is shown below:

	Male		Female	
	Number	Percent	Number	Percent
Total	373	100.0	94	100.0
To acquire new skills	112	30.0	35	37.2
To reacquire old skills	69	18.4	32	34.0
To complete high school	9	2.4	2	2.1
To complete college	101	27.0	21	22.3
To obtain advanced degree	67	18.0	1	1.1
Other	15	4.0	3	3.2

In looking for a job, the method most used by male jobseekers was direct application. The professional group utilized the interviews arranged by Boeing with other companies. Those who were not high school graduates, those in clerical, service, semi-skilled, and unskilled occupations at Boeing, and those with 7 or more weeks of unemployment relied upon the State Employment Service as their primary source of contact with job opportunities.

Implications of a serious deficiency in the effectiveness of the employment agencies were substantiated by the fact that in August the discharged workers had an unemployment rate almost six times greater than the Seattle area rate and five times greater than the United States average. This differentiation existed even though the Boeing respondents had wage demands that were realistic in relation to area rates and previous wage levels and were younger (median age 33 years), better educated (1 out of 4 men a college graduate), and more mobile (60 per cent indicated a willingness to move from the area) than the average worker.

Further indications of the inadequacies of private and public agencies stem from the responses of the unskilled and service workers, who had relied upon the agencies as a primary source of contacts for jobs, that they were hindered in finding employment by a lack of job knowledge. Public and private employment agencies, unions, and professional organizations accounted for a total of only 17 per cent of the jobs found:

	Percent of reemployed workers	
Source of jobs (male only)	Prior to 15th May	15th May to 15th August
Direct application	32.5	33.8
Friends or relatives	22.0	22.6
Boeing company interviews	11.6	11.5
Advertisements	10.7	8.0
State employment service	7.0	7.4
Commercial employment agencies	5.6	4.8
Labor union	3.9	4.6
Professional organization	.7	.3
Other	6.1	6.8

INDUSTRY OF REEMPLOYMENT

There was a great deal of redistribution of occupations, of industry, of employment, of wages, and of geographic location for the people who found employment. By mid-August, 29.9 per cent of the employed workers were no longer in the Seattle area; of those who moved, however, more than half were in a Pacific Coast State. Of the male respondents who were working in August in an industry that could be identified, less than one-third were employed in defense industry,(3) and of the employed male respondents, 55 per cent were in manufacturing - over half of them in the aerospace industry. (Most of the workers in the aerospace industry - 450 of 583 - were still in the Seattle area, and, Boeing being the principal aerospace employer, probably were Boeing recalls.)

Moving into nondefense manufacturing, trade, and services, the workers under 24 years of age showed the greatest movement out of the defense area. Older workers (men over 45 years of age) left the defense field for finance, insurance, and real estate. Government, wholesale and retail trade, and services employed the majority of workers in nonmanufacturing. (See table.)

INDUSTRY OF EMPLOYMENT OF RESPONDENTS REEMPLOYED
AT TIME OF SECOND QUESTIONNAIRE(4)

INDUSTRY	Number employed		
	Total	Male	Female
All employed respondents	2,465	2,140	325
On defense contracts	774	678	96
Manufacturing	1,167	1,032	135
On defense contracts	679	583	96
Construction	63	60	3
Transportation, utilities, and communication	109	98	11
Wholesale and retail trade	184	166	18
Finance, insurance, and real estate	103	88	15
Service	229	192	37
Government	238	198	40
On defense contracts	49	49	0

SALARIES

Among the men working at mid-May, 33.5 per cent were earning less than they earned while at Boeing and 26.1 per cent were earning more than their Boeing pay level. The median monthly salary of the working men was $25 lower than they had earned at Boeing; for employed women, the median was $325, or $63 a month lower. Of these working women, 60.5 per cent were in a lower pay interval and only 4.5 per cent were at higher rates. By mid-August, salary gaps had narrowed; the median monthly pay for men and women respectively was $499 and $375, compared with a median at Boeing of $513 for men and $406 for women working and providing earnings data.

Though no clear patterns emerged when levels of educational attainment were compared with median pay, patterns did emerge when occupational characteristics and median pay were compared. Male workers in the professional classifications were averaging, in May and August respectively, $12 and $50 a month more than they had averaged while at Boeing. Semiprofessional and unskilled workers were also getting higher pay. In all other occupation groups, average pay was less in May and had dropped still further by August.

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(3) Includes aerospace, research and government defense agencies. Defense employment is understated to the extent that shipyards and other nonaerospace industries with defense contracts are excluded.

(4) For description of questionnaires, see text footnote (1).

ONE ASPECT OF COLLECTIVE BARGAINING IN A FREE-ENTERPRISE, DEFENSE-DOMINATED INDUSTRY

Remarks by Leonard Woodcock,
Vice-President International Union, United Automobile, Aerospace and
Agricultural Implement Workers of America (UAW)

Before the Advanced Planning Briefings for Industry
Sponsored Jointly by the Department of Defense and the National Security
Industrial Association, Americana Hotel, New York City
17th March, 1965.

My particular problem of concern today is employment security. The more a particular company is dependent on government contract, the less control it has over the job security of its employees, and the wider the swings in job possibilities there can be .....

The most recent statistics show that the long term decline in blue collar aerospace employment resumed its course in 1964 after improvements in 1962 and 1963. Moreover, the Aerospace Industries Association's employment survey of member companies predicts a 7 per cent decline in total aerospace employment from mid-1964 to mid-1965. This decline would be worse, except that increased sales of civilian aircraft are expected to offset part of the decline in government aerospace business in 1965.

Even the growth in aerospace sales during recent years failed to provide job security for workers in particular areas and particular firms. In June 1961, the aerospace industry in San Diego County employed 51,000 workers. Three and a half years later, in December 1964, aerospace employment in that area was 26,800 - a loss of 24,200 jobs. From December 1963 to December 1964, the loss was 6,600 aerospace jobs.

At the largest aerospace contractor in San Diego, blue collar employment has declined by about 10,000 over the period of a few years. In recent months, work on the Atlas Missile and Centaur space vehicle programs has been phased out, and the company has not obtained enough replacement business to fill the gap.

At a smaller San Diego company, blue collar employment rose above 4,500 in the summer of 1957. At the end of 1964, the total was below 500, and was continuing to decline. About 1,000 jobs were lost during 1964 alone, largely due to phasing out of work on the Air Force's KC-135 tanker plane.

Blue collar workers faced severe problems of job security when aerospace was considered a growth industry. Now that the industry faces a leveling off or decline, the need to provide adequate protection for these workers is doubly great .....

While substantial efforts have been made to protect aerospace companies against hardship resulting from shifts in government policy, little has been done to assist and protect the individual aerospace worker whose livelihood and well-being is at stake.

The basic protection now afforded UAW members working for aerospace companies is the so-called "Extended Layoff Benefit" (ELB). Under these plans workers already laid off for four weeks receive, in some cases, a severance benefit of $75 for each year of service up to a maximum of $1,125 after 15 years of service. In other cases, they receive only $50 for each year of service, up to a maximum of $500 after 10 years of service. Each company commits a fixed amount, usually three cents for each hour worked, to pay these benefits.

The experience under these plans in the frequent situations where substantial layoffs occur is very revealing. At a major plant in Baltimore, bargaining unit employment declined from 3,600 in January 1964 to 1,900 in December 1964 due to the phase out of missiles and electronics contracts. (In 1959, employment at the same plant totaled 12,000.) Because prior layoffs depleted the ELB Fund, the 585 workers laid off in February received only $3 for each year of service instead of the $75 provided in the agreement. The 113 workers laid off in July received $7 for each year of service. The 65 workers laid off in September received $16 for each year of service.

However, in November the 13 workers laid off received $57 for each year of service, and 9 workers laid off in December received the full £75 for each year of service. This set of circumstances is as unacceptable to the company involved as to the union.

At a company in San Diego, where employment dropped from 1,400 in December 1963 to 500 in December 1964, the layoff benefits paid between June and September 1964 were only one-seventh of the company's liability under the ELB Plan. Since then, the company has stopped making all ELB payments whatever (except for a special case involving one worker). At the end of December, this ELB Plan had incurred a liability of $156,000 to 400 laid off workers. At that point, these workers had received only $12,000 of the $168,000 due them under the Plan. Even if employment stabilizes at the present level, the company would have to accumulate funds for five years just to pay off this current liability!

The private employment security plans in the aerospace industry are woefully inadequate when compared to other industries.

Of the many different programs devised to solve the problem of job security facing workers, one of the most significant is the program established by the Department of Defense for its own employees.

When Secretary of Defense Robert S. McNamara announced in November 1964 the closing of 95 bases affecting 34,500 military and 28,500 civilian jobs, he said:

"We will protect the individual employees affected by these moves. We will guarantee a job opportunity for each career employee affected by a closure. If the new job opportunity requires a move to another location, the Government will arrange for payment of transportation and moving expenses for the employee and his family. We will also arrange for retraining at our expense and continue employees' salaries while they are being retrained." (New York Times, 19th November, 1964)

An example of how this policy has been put into practice occurred in January of this year, when the United States Navy's Repair Facility in San Diego was closed. A total of 1,485 civilian workers were employed there, and the jobs of all of them were completely abolished. Yet each and every worker received another job offer. Of the 1,485 workers, 1,045 accepted another job with the Defense Department, and 16 with other federal agencies.

About half of these jobs were located in the San Diego commuting area. Moving and transportation expenses were paid for that half which relocated outside the area. A total of 146 workers retired, and 60 resigned. Those who were separated after declining a job offer numbered 218.

The Defense Department has also put an electronic computer to work to find alternative jobs for its displaced civilian employees. Information about each affected employee is coded for the computer, including the worker's skills and the other locations where he would be willing to accept work. As vacancies arise in Defense Department agencies, information about such vacancies is also collected at a central point and coded. The computer then assists in the final job of matching job openings with available and qualified employees. Outside hiring is prohibited in job categories for which displaced workers are available .....

If a Defense Department decision leads to layoffs and unemployment, the Department has a clear moral obligation to assist the workers involved, whether they are on the government payroll or on the payroll of a private contractor.

Matching Available Jobs with Available Workers

As a first step, it would seem that the computer program established to aid DOD civilian employees could be readily applied to aerospace workers who face the loss of their jobs. The regulations of the Defense Department should require all contracting companies to provide the necessary background information on employees working on government contract work who are about to be laid off. Sufficiently in advance of the layoff date, data on the skills and location preferences of affected workers should be forwarded for coding. Similarly, as a matter of policy, government contractors should be required to provide information as to job openings when requested.

Most important, they should be required to grant preferential hiring rights to the displaced workers of other government contractors. In addition, the Defense Department itself could give preference to these aerospace workers after its own displaced employees are absorbed.

The Defense Department could be an important source of jobs. The Department estimates that it hires about 96,000 new civilian employees each year. Under the base closing actions in November 1964, it expects to eliminate 28,500 civilian jobs. This leaves a balance of 67,500 job openings that would be available for displaced employees of government contractors.

When such job openings with the Defense Department or with private contractors involve moving to a new location, the Defense Department should pay the transportation and moving expenses just as it does for its own employees.

Channeling Jobs into Affected Areas

A positive Defense Department policy is also urgently needed to channel new contracts into labor market areas containing substantial numbers of displaced aerospace workers. The key point here is that some deviations must be allowed from the policy of awarding contracts to the lowest bidder. The human costs of continued joblessness plus the actual dollar costs of unemployment compensation and welfare benefits paid to the unemployed must be added to the equation when contract decisions are made.

The construction of new plants and facilities involved in defense and space work should also be directed to areas of high unemployment, as long as the location is suitable in all other respects. This policy should cover both government and private facilities.

Conversion to Civilian Uses

A major effort should be made by the government to start now with the conversion of idle defense production facilities to civilian uses. The aerospace industry has long been bothered by the problem of unused capacity. In September 1964, only 72 per cent of existing capacity in this industry was in use, while the preferred rate for all industry is about 92 per cent. If we begin now to convert our unused defense capability to civilian production, we will be better prepared to handle the larger economic problem that will arise if the United States negotiates a disarmament agreement in the future.

The problem of conversion was recognized by the Subcommittee on Employment and Manpower of the Committee on Labor and Public Welfare of the United States Senate. Among the many proposals for a comprehensive United States employment and manpower policy which it called for were: (a) planning on the part of individual companies and local communities; (b) conversion grants to contractors and communities, and financial assistance for workers faced with conversion; and (c) the establishment of a special commission to investigate and make recommendations for dealing with this urgent problem.

An Adequate Income Security Program

In the light of its special responsibilities, the government should also require that each contractor provide a supplemental unemployment benefit or similar plan for its employees. To make sure that such programs are adequate, minimum standards for such plans should be made part of the written agreement between the government agency and the contractor.

It has been proven through the ELB experience that individual employers cannot adequately finance layoff or unemployment benefits to meet mass layoff situations. To remedy this problem, a pooled fund covering all defense contractors should be established. Because the risks of layoffs would be widely shared, such a fund would be able to withstand heavy layoffs on the part of one or more employers. The government should take the initiative in establishing a pooled fund, for the government itself will have to pay the costs that are involved.

The Task Force Approach

Another device for providing job and income security in the aerospace industry is the task force approach. Numerous federal government agencies now administer programs that are of considerable value to communities faced with large scale layoffs. These programs include, among other things, retraining, counseling, intensive placement programs, surplus food distribution, assistance in attracting new industry, and VA-FHA mortgage forebearance. The co-ordinated efforts of all of the agencies involved in assisting a community and its unemployed workers proved quite helpful in South Bend, Indiana, following the closing of auto production facilities of the Studebaker Corporation in 1963. As a result of this experience, a permanent governmental task force to carry on the work of co-ordinating the various federal agencies has been organised at the request of President Johnson. Certainly, such an approach could be applied with considerable benefit to the large numbers of displaced aerospace workers in San Diego and other parts of the country.

Implemented with imagination, vigor and adequate funds, the humane and practical programs suggested above could provide job and income security for the nation's aerospace workers and put an end to the inequality of treatment they now suffer. Such programs could also help eliminate shortages of skilled labor that arise from time to time in the defense industry, and could make an important contribution to the kind of national manpower policy which is critically needed in these years of rapid technological change.

CASE HISTORY OF A FRENCH AIRCRAFT FIRM

by Mme. Michelle Durand,
Research Centre,
Institut des Sciences
Sociales du Travail, France.

INTRODUCTION

At a time when all sections of the European aircraft industry are wondering about that industry's future, it is surely not without interest that objective studies should be made with a view to justifying the opinions put forward, whether these be optimistic, as they are in some cases, or pessimistic, as in others.

Among the objective aspects of this question of the survival of a European aircraft industry, one of the first consists in knowing whether such a "wager" is commercially possible. Feasibility studies at this level are a prior condition and might well serve to determine the technical and commercial spheres in which the European aircraft industry could hope to win markets sufficient to make it viable, and the conclusions to be drawn in terms of the industry's structure.

However, a second objective aspect of the problem, and one no less important, is the need to ascertain how far European firms are capable of meeting the challenge of a genuine market economy, and what that challenge really involves. What changes will be required at firm level if the industry enters the field of international competition?

A case study based on a French firm engaged in this struggle endeavours to supply answers to these questions. It contains a description of the situation with which the firm was faced and of the changes that ensued. What were the alterations entailed by the need for efficiency and speed? What were the phases and the difficulties through which the firm had to pass in the course of its "metamorphosis", and how did the policy of the firm develop in regard to organisation, training, allocation of responsibilities and keeping the staff informed?

This case study suggests new guide lines for policy formation at firm level, both in the fields of research and planning and in that of staff policy.

I. GENERAL CONTEXT AND ORIGINS OF THE CHANGE

In an aircraft firm undergoing extremely rapid technical development, a change in manufacturing objectives had repercussions on the structure of a key sector, viz. the Technical Directorate. Distribution of responsibilities, decision levels, communication circuits and definition of functions were reviewed and gradually modified.

The change inside the Technical Directorate consisted in moving from a functional structure to a structure geared to objectives, which meant decentralising product studies. The origin and broad lines of the change may be traced through the record of the decisions and events governing it.

The firm was a nationalised undertaking. During the ten years preceding the change, i.e. from 1948 to 1958, research and production were directed solely towards the service of the State, which was the only customer. This dependence and the de facto monopoly which the firm enjoyed for its heaviest equipment conferred a measure of security which enabled it to carry on research without regard to economic competition. Contrary to the usual practice in the industry, some priority was given to manufacturing studies: the firm is a "pioneer" undertaking and its main objective is to study and manufacture engines. Of the 12,000 persons on the establishment, the Technical Directorate, which is responsible for achieving that objective, employed about 4,000. Its administration was very similar to that of an arsenal and its functional structure, on the lines advocated by Taylor, made it an undertaking of the classical type. Its policy was to build up a scientific staff of specialists, with co-ordination and overall decisions centralised at a higher level.

The Technical Directorate worked on a single family of engines. As these were all very similar, the Research Department could be organised according to specialities, which meant adopting a functional structure similar to that of the firm itself. In each speciality - materials resistance, thermodynamics, aerodynamics, metallurgy, etc. - the persons responsible worked on several of these engines. Since only one type of equipment was really concerned, each hierarchical chief was responsible for all equipment in respect of his speciality.

The Technical Director, assisted by a Principal Engineer, was responsible for co-ordination and centralised decisions.

In 1958 defence programmes were cut, and as the State was the sole customer for the single family of equipment produced, the firm was directly affected.

In order to keep the firm running and to reduce its vulnerability to this economic crisis, the Chairman General Manager decided to expand the firm's market and break its dependence on the State; 30 per cent of production was to be allotted to non-Government sales.

The Chairman's decision exposed the firm to the rigours of international competition, which was to impose its laws and rhythm on the firm's activity and in particular its research.

Technical creation was henceforward faced with new requirements regarding quantity, nature and rate of manufactures. Of the changes which occurred, we can discern the vast dimensions of an evolution.

1. Diversification of manufactures and study types increased steadily; in 1958 the firm studied a single family of jet engines - in 1959 an agreement with a foreign company increased the range of production and the firm began to manufacture new and more complex engines. From December 1960 onwards organisational reforms were introduced to integrate the preparation of new manufactures within the Technical Directorate. Moreover, on several occasions (1956-61) autonomous divisions were created for new types of equipment.

2. The need to think in terms of long-term objectives: "It takes five years to develop a jet engine and it must not be obsolete when it comes out. New techniques appear which we must be ready to take up, and ready first in the international field."

The range of possible techniques was broadening and a long-term view became essential to guide the firm's choices.

"From the management standpoint, long-term forecasts became an essential problem in view of the internal changes implied and the adjustments suggested or imposed. The latter were concerned with objectives, structures and the outlook or training of persons working in the firm."

Accordingly in 1959 a Planning Committee was set up, consisting of 12 Directors, responsible for planning the future. Its long-term forecasting mission was both scientific and economic. This role was to some extent confirmed in December 1960 by the appointment of an assistant to the Chairman General Manager, to be responsible for programmes.

3. The need for the firm to make constant progress in quality and costs, with a view to turning out marketable production. Formerly the research and prototype production departments were much more concerned about technical success than means of production and costs. In July 1962 a desire for co-ordination in this field was expressed in the creation of an Industry Department, designed explicitly for this purpose: "To ensure the existence and maintenance of liaison between research and manufacturing in the interests of profitability."

These modifications to manufacturing objectives were to cause profound changes in the firm, owing to extremely rapid and far-reaching technical developments in the pioneering sectors in which it was engaged - aeronautics, atomic energy, electronics, space research, and later cybernetics, where technical progress has been staggeringly rapid.

The Management felt that further support was needed for the new rate of adaptation required, and it was thus led to make adjustments to the firm's structures: "The experience of the last five or six years leads us to gear structures more closely to objectives, to allow them to develop, and even to improvise or adapt them temporarily to specific situations in manufacturing objectives."

II. THE CHANGE AT THE LEVEL OF THE TECHNICAL DIRECTORATE

At the level of the Technical Directorate these new orientations heralded a long evolution:

1. In this context of advanced technology, diversification of products and therefore of research called in question the functional structure of the Technical Directorate.

The "technical distance" separating old manufactures from new ones was enormous and increased steadily. The change-over called for conversion at research level, both in techniques and equipment. Both the old and the new manufactures had to be produced simultaneously. The Technical Director, who advocated the policy of recruiting specialists and was therefore a partisan of centralised decisions, attempted at first to integrate the new studies and launch the new manufactures within the framework of existing structures. The organisation and means of production designed for the construction of a single jet engine soon proved inadequate for the purpose. Once diversification was introduced, each speciality at research level found its activity also diversified, and it was no longer possible for the heads of the Technical Directorate to follow all equipment flow and coordinate all decisions relating to each product in all specialities.

Similarly, in "prototype manufacture" and in "trials and testing", the various products competed against each other. The organisation of all branches of the Technical Directorate was thus in need of review, as practically no one covered a single product in its entirety. Pending solutions which were bound to take a long time to achieve in view of the extent of the problems raised, controversy raged.

The dominant trend was that the decision centralisation typical of the functional structure made the production apparatus much too slow and in practice impeded its operation: "a functional structure is too unwieldy; short-term decisions must be decentralised and taken at the level of the services concerned." (Industrial Relations Directorate).

To increase organisational efficiency and flexibility it was clearly necessary to decentralise decisions and responsibilities so that a man or a team would undertake to coordinate all action regarding a product and thus ensure complete coverage.

These difficulties and controversies seem to have had some bearing on the resignation of the Technical Director in October 1960.

2. The firm was turning towards increased commercial production, either in research or in prototypes. If production had to be marketable, compromises in each speciality were essential, but the head of each sector, although his opinion carried great authority, was obviously neither inclined nor qualified to make compromises. With diversification of manufactures, the conception of functions had to be revised. It was no longer possible to juxtapose disciplines with no contact with each other under one general controller. Even at specialist level a minimum of all-round competence was required so that the various sectors might overlap and discussions between specialists be possible. Diversification of production called for some degree of functional all-roundness.

Gradually, with a view to decentralisation, it became clear that there would in future be room alongside the specialists for persons with far more general qualifications capable of taking responsibility for a product and following it through from the research to the trial stage.

This raised the question of staff adaptability: - training (it is now considered in the firm that an engineer should be able to be retrained for 6 months every 5 years), transfers, modification of career patterns (minimum stay in one speciality 3 years, maximum stay between 6 and 10 years). Transfers seemed hampered by problems of intellectual and psychological adaptability to a new discipline: "it was necessary to overcome a number of prejudices, such as the view that the importance of a job is measured by the number of persons under one's authority; or again, if a person employed for ten years in aerodynamics is asked to move to thermodynamics, his first reaction is to say it will be difficult, particularly if he has acquired skill and a certain salary level in his speciality and is often at a disadvantage in his new section where he is not recognised as any more competent than persons with lower salaries."

Problems also arise in connection with division of responsibilities and tasks, revision of promotion rules, etc. According to the Industrial Relations Service:

"There was a time in the firm (especially in national undertakings) when a man who was half successful could be tolerated. Measures of success were inadequate. With management geared to objectives, success is much more difficult. A manager who assumes responsibility for an objective has committed himself much further; he will be judged on the success of his objective. This is both more difficult and more human."

"The management's attitude must be revised accordingly; of course it must reward those who succeed and downgrade those who fail, but the problem is more complex. Those who fail in one place may succeed elsewhere. It is necessary to provide for great flexibility of management."

3. Up to 1958 the Research Services of the Technical Directorate carried out short-term studies at the same time as they undertook research in the disciplines in which they were engaged. Could the same men be asked to think in both short-term and long-term contexts? A long-term interpretation must be systematic, with the aim of orientating the firm's choice, working out ten-year plans, forecasting new techniques and new products and directing the various research projects, while in the short-term the firm should concentrate on specific productions, on which it was already engaged, over limited periods.

In this competitive context, would short-term problems not be likely to override and disguise long-term problems? Thus a further distinction became more and more essential - not between basic and applied research, which is a little outmoded in this connection, but between short-term research and long-term forecasting.

Functions should evolve towards the possibility of decision-making at several levels, so that short-term decisions would not go up to the General Management. One of the minimum objectives should be the suppression of the functional structure at Directorate level and its replacement by a structure defined by objectives, where the men on the job would have the real responsibility for short-term decisions.

III. APPROACH OF CHANGE

All these problems were discussed at meetings of the General Management and later at lower levels.

It was known that the new structure was to be based on a regrouping of responsibilities according to objectives, in a context of decentralisation, rather than by specialities, but it was also known that other firms had tried both systems and had ended with a compromise. The question therefore was not only to work out a theoretical structure but to verify a series of assumptions.

At the outset however, one point seemed absolutely certain, i.e. human problems must have priority. Reorganisation for a technical future must not be purely formal, but must be integrated into the progress of the firm.

The problem had two aspects:

1. Study and choice of the best structure to meet this situation;

2. After the choice was made, there would be the problem of changing over from one structure to the other, with all the consequent adjustments in attitudes, habits, etc. that this would involve and the staff problems it would raise.

IV. GRADUAL INTRODUCTION OF CHANGES

1st stage

To cope with this problem up to 1960 the Management had two types of outside advisers - a firm of management consultants solidly implanted in the company and O. & M. advisers to the Chairman sitting on the Board. Decisions regarding organisation and structures were taken by the Management without being thoroughly prepared by any functional body *inside* the firm. In this organisational context the General Manager decided in October 1960 to appoint gradually a number of "product engineers", christened more picturesquely "goal men", who would be responsible for types of product. This amounted to establishing an objectives structure alongside the usual hierarchy. The result was a hybrid leaving the usual hierarchy intact.

The limits of this operation were intended as a safeguard against the dangers of over-decentralisation. On the one hand, in a structure where complete autonomous teams were compartmented according to objectives, technical experience might well not be transmitted from one sector to another - which would seem to run counter to one of the desired aims. On the other hand, in order to economise resources, it was not possible to allot the full functional apparatus required to each individual closed unit aiming at a particular objective, as this would have led to the excessive multiplication of services. Moreover, as manufacturing objectives were essentially flexible, it was felt necessary to leave resources under the same hierarchical authority so that the work load might remain easily transmissible.

For the Industrial Relations Directorate, now about to become the firm's observation post, the new structure might be regarded as a "trial balloon"; battle was joined, ideas stirred up, habits disturbed. In practice this structure revealed certain incoherencies, and the "product chiefs", regarded as responsible for the product and judged on their success, remained in fact closely dependent on the functional hierarchy with practically no means of action of their own. Having regard to old habits and the authority of the specialist in his field, power remained in the hands of the specialities.

In an interview given at that time, a product chief referred to the ambiguity of his hierarchical position and his role:

> "I have two assistants directly attached to me, and in theory I am to draw on the 400 or so engineers under the authority of the Principal Engineer, but in practice there are very few people to whom I can give orders.... If I want to give an order, I have to go through the Principal Engineer, who passes it on..."
>
> "I consider that in this situation the 'goal man' shares his responsibilities with specialists over whom he has no hierarchical authority, and even abdicates in their favour. At the extreme limit in existing structures specialists can give advice without engaging their responsibility."

2nd stage

In October 1960 the Management made the Industrial Relations Directorate officially responsible for a new, highly empirical approach to the study of structures.

The primary responsibility of the Industrial Relations Directorate was still staff adaptation and training, which enabled it to acquire a knowledge of human problems in the firm and to collect a lot of information on the actual functioning of the undertaking. In the matter of training, from 1955 to 1964 the Directorate had pushed far ahead of other firms both as regards methods and scope of training. Within the firm its activities had expanded:

> "We began with foremen training courses; then the problems arising led us to provide training for middle managers, then for top managers, and finally to organise two seminars for the Directors themselves."

The trained labour force at first increased and then reached a period of relative stability with between 200 and 300 trainees per year. In the last ten years, and more systematically after 1960, trainers were able during courses to obtain information on trainees' impressions and difficulties and the solutions they advocated:

> "On the basis of this information, as the same problems always arose, we succeeded in detecting a number of defects and anomalies in the firm and began to wonder how it could really be improved. Gradually this training experience was used for other purposes, in particular for elaborating structural reorganisation policy." (Industrial Relations Services).

Discussions at training courses revealed a discrepancy between the technical advance gained by the firm, its ambitions in this field, and its lack of organisational control. It was necessary to establish coherent structures in line with technical progress, and in particular with sufficient flexibility to adapt constantly to changes in activity.

The extension of this "Training-Information" policy enabled the Industrial Relations Directorate to define data and specific objectives for the general reorganisation of the undertaking. At the same time it learnt much from the achievements of comparable firms like General Electric, Sud Aviation, Rolls Royce, etc. and encouraged contacts at different levels: "The firm encouraged travel to appraise the organisation of other firms in particular sectors such as production organisation or organisation of certain types of research."

Thus it was possible gradually to establish an opinion on how the overall structures of the firm ought to evolve. Henceforward new problems arising in different departments could be related to that overall development from the outset.

This empirical method of decision-making, which for several years (1960-1964) had consisted in observing problems with the help of those concerned, had two consequences in connection with the introduction of changes.

1. Changes could only be introduced gradually. In seeking an adjustment to objectives in full development, the Management (particularly those responsible for preparing the new structures) were aware of the need to invent an original structure and a new method of organisational development. Admittedly a trend had been set at the outset, but changes were not introduced in application of a theoretical structure fixed in advance; preparation and introduction of changes were linked in reciprocal inter-action.

If we consider the procedures used as a whole, we find a trial and error method rather than rigid planning. Decisions before 1960 provided ample trials and the "training-information" method acted as a sort of auto-control.

2. Realisation of the need for changes preceded their introduction in most cases. The Industrial Relations Directorate noted: "At structure level there was a considerable time-lag, to some extent a 'dephasing', but in view of the 'training-information' method, this dephasing was not beyond remedy; it was realised; managers expressed their views on dephasing. They knew something would have to be done about it. Dephasing can be tolerated for a certain period, but not indefinitely."

Thus the introduction of changes merely confirmed a situation for which middle management was already prepared and which they had helped more or less directly to develop.

Although it may have been derived from another source, we feel it appropriate to refer here to an experiement which took place parallel to the activities of the Industrial Relations Directorate and directly concerned the firm's adaptation to the changes. This was the applied forecasting experiment launched by the Chairman General Manager in 1961 in conjunction with the O. & M. centre.

In this experiment, after a series of lectures, managers were invited to take part in a long-term forecast of the firm in three significant sectors:

(a) Forecast of the firm's activities

(b) Forecast of men and functions

(c) Forecast of structures.

This extra-hierarchical experiment was first confined to top managers, but was soon extended to large numbers of middle managers and certain technicians at the request of the General Management. Contacts with Trade Unions with a view to their collaboration were planned for 1964.

While it was successful in a first stage - "working out a future" - this experiment certainly raised more complex problems as it came to putting the chosen objectives into practice. We shall not describe the experiment in detail as the firm has published a paper on it (1).

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(1) Editions Fayard, 1963.

Whatever its limits and the manner of interpretation, this experiment cannot be dismissed as a mere intellectual diversion. It is symptomatic of the desire to make staff participate in the objectives of the firm. The experiment consisted in an intellectual projection of the various operating factors of the firm to 1970. As "militants of the future", managers thus measured the distance to be covered in order to reach the objectives.

This experiment, involving criticism of the firm by its own staff, implies staff participation in development values in a common reference system.

3rd stage

In January 1964 the "product chiefs" were appointed "product chief engineers". This new stage is likely to prove decisive in the evolution of structures.

The product chief engineer now has full powers of decision regarding his product. He is its privileged constructor and its representative inside and outside the firm. Fifty engineers and draughtsmen are directly attached to him. He becomes the dominant element in the functioning of the Technical Directorate.

Substantial resources remain grouped in the specialised departments, but a new method of relations has been established between "goal men" and specialists, based on the "customer-firm" model. Product chief engineers become customers and the specialised departments firms meeting the customers' demand.

The Industrial Relations Directorate considers that "evolution is not complete", that there is still much incoherence in relation to "inspiration", but the reform of the Technical Directorate, a pilot sector, will bring in its train a general evolution of the firm. It is already expected that the objectives structure established in the research, prototypes and testing services is bound to include series production.

The General Management has retained a functional structure. However, the record of Board decisions shows a tendency to organise new products requiring new resources into independent product units (cf. October 1961). As examples of this trend, there is the operational group set up in February 1962 on competitive production for a limited period, and the Secretariat formed in September 1963 in the General Management and to which is attached a mission on Project "C".

CONCLUSIONS

What are the reasons for this era of organisational and human changes in the firm? Are they due merely to the energy of its Management, to their deliberate looking to the future, and the priority they give to human problems in the firm?

If we look at the facts, we find a quasi-experimental situation with technical development amplifying to the full the problems involved in diversification of manufacture. In the end diversification is possible only in the context of general reorganisation and reorientation of staff policy.

Admittedly the evolution of manufacturing objectives and especially the fact that they are liable to develop rapidly were taken into consideration, and clearsighted men were needed to do it, but it may be thought that most of the problems raised here are direct consequences of the change in manufactures. Once specialised and stable, they have now become multiple and flexible, and it is doubtless not by chance that the firm's effort of adaptation concentrated on organisation and staff.

The analysis of this case history thus seems to confirm Joan Woodward's argument that it is possible to define a cause and effect relationship between a system of production and a method of organisation (1).

In other words, the following problem may be posed: although some firms are more inclined than others to review their organisation or perceive the incidence of changes on human factors, it may be asked whether certain types of change do not affect organisation more than others.

In her study on the incidence of technology on business management and organisation, J. Woodward concludes that technical changes which do not involve changes in objectives or production systems are unlikely to make any great alteration in the method of organisation.

The importance of such conclusions for the adaptation of organisations to change is obvious:

1. They have an immediate practical interest: systematic analysis of the requirements of the situation might be used in order to predict repercussions of technical changes on management structure and thus simultaneously forecast technical and cultural modifications. Here we recognise a measure widely used by the firm to solve its problems.

2. If the method of organisation depends on the characteristics of the objectives, the adapted organisation should be conceived in terms of these objectives. In this event, the proper functioning of an organisation can no longer be considered as independent of the firm's general objectives. Choice of structure and definition of the necessary functions and method of inter-functional relations are dependent on general policy. The elements of staff policy must be reviewed and aligned with the firm's objectives, instead of with management principles or organisational rules or techniques.

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(1) Cf. "Hommes et Entreprises", Sept.1960, extracts from Management and Technology.

INTERNATIONAL SEMINAR PUBLICATIONS

1963-1 International Trade Union Seminar on Active Manpower Policy Vienna
17th-20th September, 1963
Final Report (1964)
Supplement to the Final Report (1964)

1963-2 International Trade Union Seminar on Economic and Social Programming Paris
22nd-25th October, 1963
Final Report (1964)
Supplement to the Final Report (1964)

1963-3 International Joint Seminar on Geographical and Occupational Mobility,
Castelfusano 19th-22nd November, 1963
Final Report (1964)
Supplement to the Final Report (1964)

1963-4 International Joint Seminar on Adaptation of Rural and Foreign Workers
Wiesbaden 10th-13th December, 1963
Final Report (1965)
Supplement to Final Report (1965)

1964-1 International Management Seminar on Active Manpower Policy
Brussels 14th-17th April, 1964
Final Report (1965)
Supplement to the Final Report (1964)

1964-2 International Management Seminar on Job Redesign and Occupational Training for
Older Workers
London 30th September - 2nd October, 1964
Final Report (1965)
Supplement to Final Report (1965)

1964-3 North American Joint Conference on the Requirements of Automated Jobs
Washington 8th-10th December, 1964
Final Report and Supplement (1966)

1965-1 International Management Seminar on the Public Employment Services and
Management
Madrid 23rd-26th March 1965
Final Report (1966)
Supplement to Final Report (1966)

1965-2 Papers for a Trade Union Seminar on Non-Wage Incomes and Prices Policy
Report (1966)
Supplement to the Report (1966)

1965-3	Papers for a Trade Union Seminar on Low Income Groups and methods of dealing with their problems Report (1966) Supplement to the Report (1966)
1966-1	European Conference on Manpower aspects of Automation and Technical Change Zurich, 1st-4th February, 1966 Report (1966) Supplement (1966)